

**DERMATOLOGIC
MEDICATIONS**

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To
OUR PARENTS

Preface

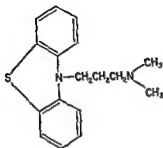
THIS IS A BOOK about drugs used in dermatology—what they are, how they work, when to use them. Six years ago the first edition of this book was written. Since then, much has happened in dermatologic therapy. The steroids have come into their own. Antibiotics have multiplied. More effective treatment of fungous diseases and lupus erythematosus has been developed. And a new drug—the tranquilizer—has been born.

Time was when the physician had to concoct esoteric prescriptions to treat different skin disorders. Today, there is an abundance of commercial preparations available. To prevent this situation of plenty from becoming a surfeit, the physician must be able to choose which of many agents is the best for the particular disease of each patient.

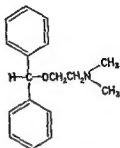
Whenever possible, the chemical structure and mechanism of action are given for both trade items and those still valuable preparations which must be made up by the pharmacist. In a sense, then, this book is a reference work for the dermatologist. The purpose, for example, in the section on antibiotics, indications for use, dose, action mechanisms and formulas are given, but little is said about the numerous tablets, capsules, suspensions, injectables etc., in which the antibiotics are available.

For the busy physician who asks, "Why should I know the structural formula of a drug?" or "How will such knowledge help me in my practice?" there are several answers other than the one of satisfying curiosity. For example, Schering sells a good

formulas, the same chemical names. If a patient did not obtain



Sparine



Benadryl

We have grouped the drugs and drawn their formulas so as to show their structural relationships.

Because therapeutic horizons are expanding rapidly, it is necessary to take an inventory of the preparations most commonly used in dermatology today—to set forth the indications for their use, to explain their mechanism of action and to compare their likenesses and differences. It is with these aims that this book was written so that the physician can adopt a rational and

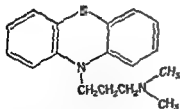
for their help in the preparation of this manuscript.

M.R.L.

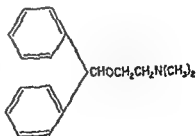
ABL

a satisfactory response to one of these two antihistamines or suffered an adverse reaction from one of them, it would be worthless—possibly even harmful—to substitute the other

Another example of the need for comparing formulas Temaril is promoted primarily as an oral antipruritic. Yet the structural formulas of Temaril, Compazine and Sparine are quite similar. Although in some cases it is true that a small change in chemical structure makes a great difference in biologic response, the altered methyl groups of these three compounds would seem to have little effect since all three drugs retain good tranquilizing properties. Furthermore, inspection of Temaril's structural formula suggests that this drug is a potential photosensitizer like its analogues, Thorazine and Phenergan. If a patient has a hypersensitivity reaction to a drug, such as an antihistamine, antibiotic, sedative, tranquilizer, etc., it is good to select another drug with a chemical structure which is different from that of the offending agent. This is best accomplished by comparing the formulas of the various drugs. Also, it is important to know that when the structures are written properly some groups of drugs are related chemically and have overlapping biologic properties. For example, the phenathiazine compounds are structurally similar to the antihistamines. Indeed, most of the phenathiazines have antihistaminic properties. Likewise, the antihistamines, such as Benadryl, have tranquilizing properties. The formulas for the tranquilizer, Sparine, and the antihistamine, Benadryl, usually are written as follows. Few similarities seem to exist.



Sparine



Benadryl

However, they can be written in the following way to show their common features

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Decreasing acuteness of lesions →

WET DRESSINGS	LOTIONS LINIMENTS	CREAMS OINTMENTS
weeping	edema	scaling
heat	heat	lichenification
edema	chapping	pruritus
crusting	pruritus	infection
pruritus	infection	erythema
infection	erythema	
erythema		

Schematic Presentation of Indications for Topical Treatment

Acne Preparations

TREATMENT OF ACNE VULGARIS includes the use of both topical and systemic medications. Topical therapy and ultraviolet light help control the seborrheic component and follicular plugging. Systemic antibiotics inhibit the growth of micro-organisms. Oral administration of estrogens and exposure of the skin to x rays decrease sebaceous gland activity. Choice of treatment depends in part on the extent and severity of involvement and the age and sex of the patient. X rays, systemic antibiotics and estrogens are usually very effective agents. However, they have definite limitations because their effects are not lasting, they may be expensive, and they may have undesirable side reactions. For these reasons it is important to concentrate on topical means of therapy with or without ultraviolet light even though the effects of these measures are not as dramatic as those of other modalities.

For mild acne (seborrhea, comedones, few papules) only local therapy is indicated. For moderate acne (much seborrhea, many comedones, papules and pustules) topical measures should be used vigorously. On occasion antibiotics, x rays and estrogens may be tried. For severe cases (cysts in addition to milder lesions) surgical drainage is often indicated. In addition to local therapy, antibiotics, estrogens or x rays may be given. Steroids are used topically if a marked inflammatory component is present.

TOPICAL PREPARATIONS

The ingredients of topical medicaments consist of some form of sulfur, salicylic acid, resorcinol, ethanol, propanol and acetone. A great variety of commercial preparations are available. Only a few will be mentioned here.



Ethanol

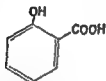


Isopropanol



Acetone

These organic solvents can be applied to the skin in order to remove secretions from the orifices of sebaceous glands. Ethanol and acetone have an advantage over isopropanol in that their boiling points are low, hence the skin dries rapidly after they are applied.



Salicylic acid



Resorcinol

Salicylic acid and resorcinol are keratolytic agents which reduce follicular plugging.

S_8

Sulfur

At least three different types of sulfur are used pharmaceutically: precipitated, sublimed and colloidal. All forms are over 99% pure. Precipitated sulfur exists in a finer state of subdivision than sublimed sulfur. Precipitated sulfur is microcrystalline or amorphous, while sublimed sulfur occurs as larger crystals. The particle size of colloidal sulfur is even smaller than that of precipitated sulfur. Sulfurated potash is a mixture of potassium polysulfides and potassium thiosulfate. It contains not less than 12.8% sulfur in combination as sulfide.

When sulfur comes in contact with the skin a chemical reaction occurs so that hydrogen sulfide and sulfur-containing acids are formed. These sulfur compounds inhibit the growth of microorganisms. They have a drying action on the skin and may decrease the activity of sebaceous glands.

Sal Alcohol

Salicylic acid 1%
In 70% ethyl alcohol

Isopropyl alcohol can be substituted for ethyl alcohol. However, ethyl alcohol evaporates faster than isopropyl and is more comfortable to use.

Sebasum (Summers)

Ethyl alcohol	50 %
Acetone	14 %
Polysorbate 80 (Tween)	1.3%
Perfume and coloring agents	0.9%
Distilled water	33.8%

Available in 4 oz bottles

Seba-Nil (Texas Pharmacol)

Ethyl alcohol	50 %
Acetone	
Hexachlorophene	0.25%
Sorbitan monolaurate	

Available in 8 and 16 oz bottles.

S. A. R. Lotion

Salicylic acid	0.5%
Resorcin	5.0%
In 70% ethyl alcohol or isopropyl alcohol	

Available on prescription.

Application Sal alcohol, Sebasum, Seba-Nil and S. A. R. lotion should be applied with cotton to the involved areas 2 to 4 times daily

Lotio Alba (White Lotion), N. F.

Zinc sulfate	4%
Sulfurated potash	4%
In distilled water	

Lotio alba must be freshly prepared every 3 months. Apply nightly

Pronac (Fougera)

Zinc sulfate	0.4 Gm
Sulfurated potash	0.6 Gm

The above contents of one envelope should be mixed with 1 tablespoon of water and applied to the face at bedtime. This is an easy way to prepare lotio alba freshly for use each night.

Available in boxes of 12 and 100 envelopes.

Lotrioblanco (Arnar Stone)

This preparation contains the same ingredients as lotio alba N F, plus inert stabilizing agents to keep the suspension uniform. Apply nightly.

Available in 4 oz bottles

Vlemminckx' Solution, N F 10th ed

Lime	16.5%
Sublimed sulfur	25.0%
In water	

Dissolve 1 tablespoonful (16 ml) in 1 pt of hot water to make 1/32 solution. Use as a hot wet compress nightly.

CaO
Lime (Calcium oxide)

In water, calcium oxide is converted to calcium hydroxide.

Available on prescription

Vlem-Dome (Dome)

Calcium pentasulfide	60.5%
Calcium thiosulfate	4.5%
Sulfur	4.5%
Inert materials	30.5%

Dissolve contents of 1 packet in pint of hot water and apply as hot compress for 15 minutes nightly.

Available in boxes of 12 and 100 envelopes

Sulpho-Lac Cream (Kelgy)

Modified Vlemminckx solution	57%
Zinc sulfate	23%
Glycerin	3%
Colloidal sulfur	1%
Inert material	2%
Distilled water	14%

Apply nightly

Available in 1, 2 and 4 oz jars.

ACNE MAKE UP**Acnomel (Smith Kline & French)**

CREAM

Sulfur

■ ◀

Resorcinol	2%
Hexachlorophene	0.25%
In flesh tinted water-washable base	

Available in 1½ oz. tubes

CAKE

Sulfur	4%
Resorcinol	1%
Hexachlorophene	0.25%
In flesh-tinted cake base	

Available in 1 oz. compact.

Resulin (Almay)

LOTION

Sulfur	8%
Resorcin	4%
In a lotion	

Available in 4 oz. bottles in regular and half strengths and in blond and brunette shades.

OINTMENT

Sulfur	4%
Resorcin	2%
In a vanishing cream base	

Available in 1½ oz. tubes in blond and brunette shades

Acne-Dome (Dome)

CREAM OR CAKE

Sulfur	8%
Resorcinol monoacetate	5%
2,2' thiodis (4,6-dichlorophenol)	1%
In a water washable ointment or cake base	

Available as cream in 1 oz. tubes and as cake in compacts in regular and half strengths and in medium and medium-dark shades.

STEROIDS

Several preparations are available containing sulfur compounds with steroids for the treatment of the inflammatory component of

acne However, the steroid concentration often is low, being 0.25% hydrocortisone It may be advisable to use steroid lotions or ointments containing 1% hydrocortisone or 0.1% triamcinolone acetonide Acute acne cysts may be treated by injection of hydrocortisone solution available for intramuscular use.

SOAPS

Sulfur-containing soaps can be used to aid in the treatment of acne These are listed in the section on Soaps, Shampoos and Baths.

SYSTEMIC AGENTS

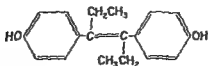
ANTIBIOTICS

For moderate to severe acne it is often advisable to give a course of antibiotic therapy in order to bring the disease under control Subsequently, local therapy may be sufficient to maintain a fair state of remission After a few months another course of treatment may be indicated

Broad spectrum antibiotics, particularly the tetracyclines, are usually the agents of choice 250 mg 3 or 4 times daily for 7-10 days

ESTROGENS

Whereas progesterone and testosterone cause increased sebum levels and exacerbation of acne, estrogens suppress sebaceous gland activity and are sometimes helpful in severe acne Commonly used substances are diethylstilbestrol or Premarin (water-soluble estrogens from pregnant mares' urine) The schedules given below may be tried for 3 to 6 months



Diethylstilbestrol

Dose for females Premarin, 0.625-1.25 mg, or diethylstilbestrol, 0.25-1.0 mg daily by mouth, beginning with the 14th day of the menstrual cycle and discontinuing hormones the day before the expected onset of menses so that menstruation can occur.

Dose for males The above hormones may be given for short periods such as 10 days of each month, with complete cessation of estrogens if undesirable side effects such as gynecomastia or impotence occur.

Available as diethylstilbestrol in 0.25, 0.5 and 1 mg tablets and ■ Premarin in 0.625 and 1.25 mg tablets.

Anesthetics for Topical Use

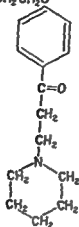
THERE IS A NEED for topical anesthetic agents with a low incidence of sensitization. Nupercaine is effective in some disorders, but unfortunately it is highly sensitizing. Dyclone and Quotane have been promoted as differing from the "caine" anesthetics. It is of interest to compare the structural formulas of these two substances with those of procaine and Nupercaine. It will be noted that some similarities exist. These structures also are related to the antihistamines and some of the tranquilizers. Dyclone has been singled out as having antiseptic as well as anesthetic properties. These agents are applied 2 to 4 times daily. Dyclone solution may be used as a wet dressing.

Dyclone (Pitman Moore)

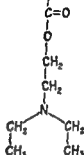
0.5% solution in 1 oz. bottles and 1% cream in 1 oz. tubes.

Quotane (Smith, Kline & French)

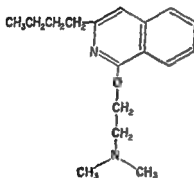
0.5% Quotane in a water washable ointment base in 1 oz. tubes and 0.5% Quotane with 0.1% menthol in a lotion in 2 oz. bottles.



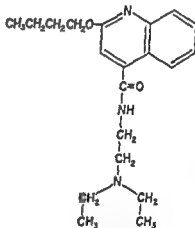
Dyclone



Procaine



Quotane



Nupercaine

Antihistamines

THE SYSTEMATIC SEARCH for a substance capable of blocking the action of histamine began in 1937 in France. By 1942 the first

experimental antihistaminic drug that could be used in clinical trial with some measure of safety was synthesized and named Antergan. Between 1942 and 1945 animal experiments were carried out using Neo-Antergan, Benadryl and Pyribenzamine which were relatively nontoxic and safe for clinical use. Since then a host of related substances has been developed.

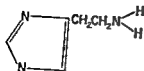
Antihistamines produce their effect by blocking some of the actions of histamine rather than by causing pharmacologic responses which are antagonistic to those induced by histamine. No antihistamine antagonizes all the effects of histamine. And all antihistamines have some physiologic action unrelated to histamine interference.

Indication. The antihistamines are used in urticarial types of hypersensitivity and angioneurotic edema. They may be worth while although their value has not been proved in other allergic reactions and in eczematous eruptions associated with pruritus. They are useful for mild sedation and are beneficial as a mouthwash or spray for painful mucous membrane lesions such as occur in pemphigus and aphthous stomatitis.

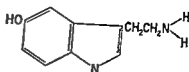
Mechanism of action. It will be noted in the following chart that a side chain $-\text{CH}_2\text{CH}_2\text{N}-$ is common to histamine, serotonin, nor-epinephrine and epinephrine. This side chain also occurs in the antihistamines, antiemetics, anti motion sickness drugs and some of the tranquilizers. It is likely that because of this common side chain antihistamines can compete with histamine for physiologic receptor sites in the cell and thereby block the response to histamine. Part of the action of epinephrine in combating allergic reactions may be on a similar basis. The antihistamines do not prevent release of histamine or undergo chemical reaction with it.

Since the common side chain also is present in potent physiologic substances other than histamine, it is no wonder that the antihistamines have pharmacologic actions independent of histamine blockage. As tranquilizers, they influence serotonin and nor-epinephrine metabolism in the central nervous

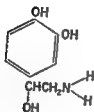
PHYSIOLOGIC AMINES



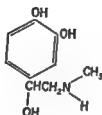
Histamine



Scrotonin

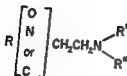


Nor-epinephrine



Epinephrine

THE THREE ANTIHISTAMINE GROUPS



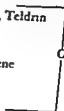
Benadryl
Ambodryl
Decapryn
Dramamine
Diafen



Pynbenzamine
Neo-Antergan
Thenfadil
Phenergan
Theruhistin
Pyrrolazote
Thenylene, Histadyl
Tagathen



Chlor-Trimeton, Teldrin
Polaramine
Dimetane
Actidil
Perazil, D₁ Paralene
Bonamine
Thephorin
Pyronul



system. They have antiemetic and anti motion sickness properties. Topically, most antihistamines are local anesthetics. The common side chain also is found in substances such as procaine.

The $-\text{CH}_2\text{CH}_2\text{N}-$ group is attached to the rest of the molecule through an oxygen, nitrogen or carbon atom. In some of the antihistamines with a carbon attachment the carbon atom is asymmetric, and the drugs are obtained as DL mixtures. In one case (Chlor-Trimeton) resolution showed that only the dextro form (Polaramine) is active biologically whereas the levo form is inactive.

Toxic agents which produce urticaria probably do so by acting upon the mast cells in the dermis which release histamine and heparin in response to injury. In some allergic reactions one observes the triple response of Lewis which consists of

- 1 Red reaction—due to capillary dilatation
- 2 Diffuse flare—due to arteriolar dilatation mediated through an axon reflex
- 3 Wheal or local edema—corresponding to the previous site of capillary dilatation resulting from transudation of fluid because of increased capillary permeability

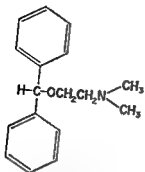
The first and third components of this response result from the release of histamine. Antihistamines can block histamine and prevent the development of these effects.

When present as the hydrochloride, antihistamines do not penetrate intact skin. They are absorbed in damaged skin and may be effective in some cases of pruritus. It is possible that some of the antipruritic action resulting from local application of antihistamines is due to inhibition of the cutaneous nerve endings which transmit the sensations of itch and pain. Unfortunately, the antihistamines are not effective in the treatment of pruritus due to other causes.

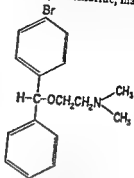
Side effects: The most common adverse reactions to the antihistamines are sedation, excitement, vertigo, dryness of the mouth, nausea, diarrhea and dermatitis.

The antihistamines usually are prepared as the hydrochloride, malate,

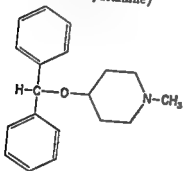
STRUCTURAL FORMULAS



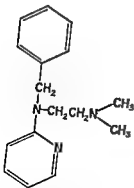
Benadryl
(Diphenhydramine)



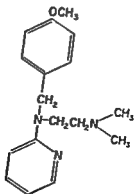
Ambodryl
(Bromodiphenhydramine)



Diafen
(Diphenylpyraline)

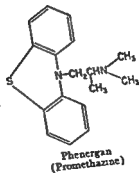
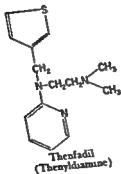
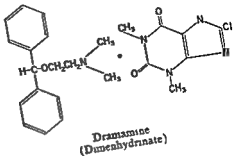
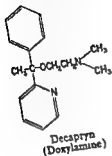


Pyribenzamine
(Tripeleminamine)

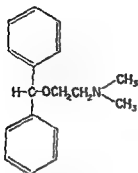


Neo-Antergan
(Pyrilamine)

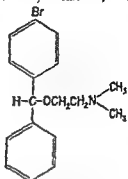
OF THE ANTIHISTAMINES
succinate, citrate or tartrate. However, the salt forms are not given in this book



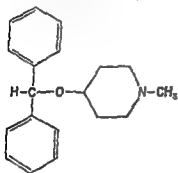
The antihistamines usually are prepared as the hydrochloride, maleate,



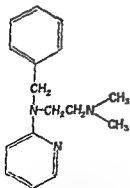
Benadryl
(Diphenhydramine)



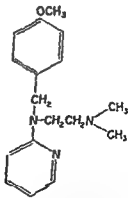
Ambodryl
(Bromodiphenhydramine)



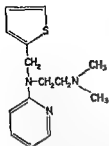
Diafen
(Diphenylpyraline)



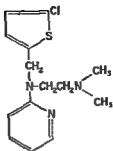
Pyribenzamine
(Triplennamine)



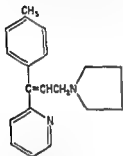
Neo-Antergan
(Pyrilamine)



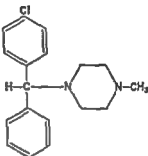
Thenylene, Histadyl
(Methapyrilenes)



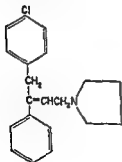
Tagathen
(Chlorothen)



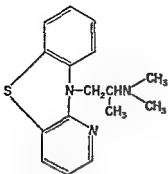
Actidul
(Triprolidine)



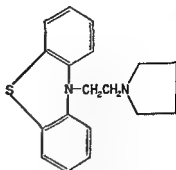
Peranil, D, Paralene
(Chlorcycizine)



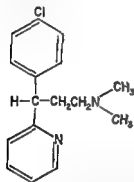
Pylonil
(Pyrrobutamine)



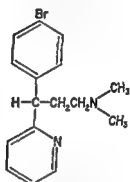
Theruhistin
(Isothipendyl)



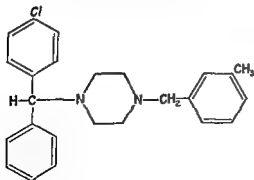
Pyrrolazote
(Pyrathiazine)



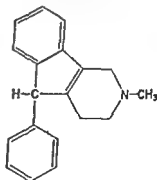
Chlor-Trumeton, Teldrin
(DL mixtures), Polaramine (D form)
(Chlorpheniramine)



Dimetane
(Parabromdylamine)

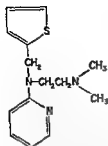


Bonamine
(Meclizine)

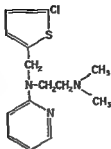


Thephorin
(Phenindamine)

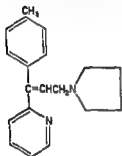
THE ANTIHISTAMINES (Cont)



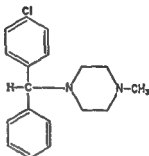
Thenylene, Histadyl
(Methapyrilene)



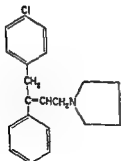
Tagathen
(Chlorothen)



Actidil
(Triprolidine)



Peranl, Di Paralene
(Chlorcyclizine)



Pyronal
(Fyrobutamine)

Antihistamines are available in many forms—tablets, capsules, liquids, suppositories, sustained release preparations, etc. Because individuals react differently to the antihistamines, the drug that is effective in one case may be ineffective in another with regard to either the antihistaminic or the sedative action. Consequently, if satisfactory results are not obtained with one antihistamine, another may be tried. Sometimes combinations of antihistamines are more effective than comparable doses of one alone. The commonly used antihistamines and their oral doses are:

ANTIHISTAMINE	ADULTS 3-4 Times Daily*	CHILDREN 1-4 Times Daily	
Benadryl 25 and 50 mg capsules Elixir 10 mg/4 ml	50-100 mg.	Under 1 yr 1-5 5-12	5 mg 10-20 mg 20-50 mg
Ambodryl 25 mg capsules Elixir 10 mg/4 ml	25-50 mg	Under 1 yr 1-5 5-12	5 mg 10-20 mg 20-50 mg
Decapryn 12.5 and 25 mg tablets Syrup ■ 25 mg/5 ml	12.5-25 mg	Under 1 yr 1-5 5-12	3.1 mg 6.25 mg 6.25-12.5 mg
Dramamine 50 mg tablets Liquid 12.5 mg/4 ml. Suppositories 100 mg	50 mg	1-5 yr 5-12	6.3-12.5 mg 12.5-25 mg
Difen ■ mg tablets	2 mg	1-5 yr 5-12	1 mg 2 mg
Pyribenzamine 25 and 50 mg tablets Elixir 20 mg/4 ml	50-100 mg	Under 1 yr 1-5 5-12	5 mg 10-20 mg 20-50 mg
Neo-Antergan 25 and 50 mg tablets	25-50 mg	1-5 yr. 5-12	10 mg 25 mg
Thenfadil 15 mg tablets	15 mg		
Phenergan 12 ■ and 25 mg tablets	12.5 mg 3-4 x daily 25 mg h s		
Theruhistin 4 mg tablets Syrup 2 mg/5 ml	4 mg	1-5 yr 5-12	1 mg 1-2 mg
Pyrrolazote 25 and 50 mg tablets	25-50 mg	5-12 yr	12.5-25 mg

*Unless otherwise specified

ANTHISTAMINE	ADULTS 3-4 Times Daily*	CHILDREN 1-4 Times Daily	
Thenylene, Histadyl 50 mg tablets and capsules	50-100 mg		
Targathen 25 mg tablets	25-50 mg		
Chlor Trimeton, Teldrin 4 mg tablets Syrup 2 mg/5 ml (Teldrin—capsule only)	4 mg	Under 1 yr 1-5 5-12	0.5-1 mg 1-2 mg 2-4 mg
Polaramine 2 mg tablets	2 mg		
Dimetane 4 mg tablets Elixir 2 mg/5 ml	4-8 mg	1-5 yr 5-12	2 mg 2-4 mg
Acudal 2.5 mg tablets Syrup 1.25 mg/5 ml	2.5 mg	Under 1 yr 1-5 5-12	0.6 mg 1.25 mg 1.25-2.5 mg
Peranal D; Paralene 15 and 50 mg tablets	50 mg 1-2 x daily	Under 1 yr 1-5 5-12	12.5 mg 12.5-25 mg 1.25-2.5 mg 1-2 times daily
Bonamine 25 mg tablets or chewing tablets Elixir 12.5 mg/5 ml	25 mg	5-12 yr	12.5-25 mg once daily
Thephorin 10 and 25 mg tablets Syrup 10 mg/5 ml	10-50 mg		
Pyronil 15 mg tablets	15 mg		

EPINEPHRINE FOR ACUTE ALLERGIC REACTIONS

Epinephrine (Adrenalin) is the treatment of choice for acute anaphylactic reactions. It is also useful for acute giant hives and laryngeal edema. Some of its actions are similar to those of the antihistamines. It may prevent urticaria formation by causing vasoconstriction and decreasing vessel permeability so that fluid does not escape into the tissues. It is possible that epinephrine may have a slight action in stimulating the pituitary gland to produce adrenocorticotrophic hormones.

Antihistamines are available in many forms—tablets, capsules, liquids, suppositories, sustained release preparations, etc. Because individuals react differently to the antihistamines, the drug that is effective in one case may be ineffective in another with regard to either the antihistaminic or the sedative action. Consequently, if satisfactory results are not obtained with one antihistamine, another may be tried. Sometimes combinations of antihistamines are more effective than comparable doses of one alone. The commonly used antihistamines and their oral doses are:

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Decapryn 12.5 and 25 mg tablets Syrup 6.25 mg./5 ml	12.5-25 mg	Under 1 yr 3.1 mg 1-5 6.25 mg 5-12 6.25-12.5 mg
Dramamine 50 mg tablets Liquid 12.5 mg./4 ml Suppositories 100 mg	50 mg	1-5 yr 6.3-12.5 mg 5-12 12.5-25 mg
Diafen 2 mg tablets	2 mg	1-5 yr 1 mg 5-12 2 mg
Pyribenzamine 25 and 50 mg tablets Elixir 20 mg./4 ml	50-100 mg	Under 1 yr 5 mg 1-5 10-20 mg 5-12 20-50 mg
Neo-Antergan 25 and 50 mg tablets	25-50 mg	1-5 yr 10 mg 5-12 25 mg
Thenfadil 15 mg tablets	15 mg	
Phenergan 12.5 and 25 mg tablets	12.5 mg 3-4 x daily 25 mg h.s.	
Theruhistin 4 mg tablets Syrup 2 mg./5 ml	4 mg	1-5 yr 1 mg 5-12 1-2 mg
Pyrolazote 25 and 50 mg tablets	25-50 mg	5-12 yr 12.5-25 mg

*Unless otherwise specified

quired. Oozing is a contraindication to the use of lotions because caking may occur, leading to retention of debris and bacteria. Liniments are lotions which contain oil. They are unstable emulsions of oil in water which may or may not contain powder and are used in acute, nonweeping dermatoses when cooling and protection without excessive drying are required. Ointments are semisolids containing oily substances. They are used for lubrication and protection, as explained in the section Ointment Bases and Lubricating Agents. Topical use of steroids for treatment of pruritus is given in the section on Steroids and ACTH.

LOTIONS AND LINIMENTS

These preparations are used for the treatment of acute dermatitis, especially when the skin is raw and weeping. They are applied over a soft padding.

They should not be put on oozing or crusted lesions since they may occlude the area and promote bacterial growth. The following lotions and liniments are available on prescription.

Calamine Lotion (suspension)

Calamine	80 Gm
Zinc oxide	80 Gm
Glycerin	20 ml
Bentonite magma	250 ml
Calcium hydroxide solution m make	1,000 ml

Calamine is zinc oxide (ZnO) with 0.5% ferric oxide (Fe_2O_3) for coloring purposes. Because of the variable color of calamine, the National Formulary previously recognized Prepared Neocalamine, which is 93% zinc oxide (ZnO), 3% ferric oxide (Fe_2O_3) and 4% yellow ferric oxide ($2\text{Fe}_2\text{O}_3 \cdot 3\text{H}_2\text{O}$). Although neocalamine simulates natural skin color more closely than calamine, it is not as useful because it stains clothing. Bentonite magma is a form of bentonite used as a suspending and emulsifying agent. It is a clay mineral consisting chiefly of aluminum silicates and small amounts of feldspar, gypsum,

Dose A 1:1,000 solution of Adrenalin in water may be given subcutaneously or intramuscularly as follows

Adults—0.2–0.3 ml Repeat every 2 hours if necessary

Children—0.1 ml/10 kg of body weight Maximum single dose is 0.3 ml

A 1:500 solution in oil may be given to adults in a single dose of 1 ml

Antipruritic Lotions, Liniments and Ointments

UNTIL THE ADVENT of steroids for topical use, lotions, liniments and ointments were used in dermatologic treatment because their physical properties made them of therapeutic value. The steroids have an almost specific chemical action in the control of eczematous changes and pruritus. This chemical effect is often much greater than that afforded by the physical properties of lotions, liniments and ointments. It is for this reason that in the past few years the steroids have replaced so many of the older topical preparations. However, the nonsteroid lotions, liniments and ointments still are useful when it is necessary to cover large parts of the body, when steroids are contraindicated and when it is necessary to have an inert vehicle for a drug.

Nowadays lotions are suspensions of powder in water to which a suspending agent, such as methylcellulose, has been added. Formerly the suspensions of powder were unstable and the lotions had to be shaken before application—hence the term shake lotions. Lotions also contain hygroscopic agents which, by decreasing the rate of evaporation of water from the skin, promote a uniform and continuous rate of evaporation, leading to cooling. In addition, after most of the water has evaporated, the remaining powder particles form an adherent protective layer on the skin. Lotions are of value in the treatment of acute, nonweeping dermatoses when cooling, drying and protective actions are re-

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LOTIONS AND LINIMENTS

These preparations are used for the treatment of acute dermatitis, especially when pruritus is present and the stage of weeping is over. They may be applied to the skin with the finger tips or a soft paint brush 2 to 4 times a day. Lotions or liniments should not be put on oozing or crusted lesions since they may occlude the area and promote bacterial growth. The following lotions and liniments are available on prescription.

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Tucks (Fuller)

Tucks are flannel pads impregnated with glycerin and witch hazel. They are used as a substitute for toilet tissue in the treatment of anal pruritus.

Glycerin	10%
Witch hazel	50%
Distilled water	40%

Witch hazel, a fluid extract of twigs of *Hammamelis virginiana* contains tannin, gallic acid and volatile oil.

Available in jars containing 120 pads

OINTMENTS

Ointments are used to combat pruritus and for lubrication after the acute stage of dermatitis has subsided. The ointment base occludes the surface of the skin, thus reducing loss of water. Retention of water results in swelling of the horny layer. In addition, there may be an increase in permeability so that drugs incorporated in the ointment can penetrate more easily. For these reasons, ointment bases alone or in conjunction with salicylic acid are useful for the treatment of dry skin, pruritus hiemalis (winter itch) or ichthyosis. Water washable bases usually retain less water on the skin surface than water in-oil or inert oil bases. However, the water washable bases are more easily removed from the skin.

Substances commonly incorporated into ointments are phenol, menthol, camphor, salicylic acid and tar. Phenol acts directly on the free epidermal nerve endings to cause analgesia. Menthol acts directly on the cold receptors of the skin to cause a feeling of coolness, thus suppressing the sensation of itching. Camphor is absorbed through mucous membranes and from subcutaneous tissue. When used locally, it has an irritant effect and probably a benumbing influence upon the peripheral sensory nerves. It acts as a local anesthetic to relieve itching. Salicylic acid is keratolytic; that is, it causes shedding of the horny layer and permits penetration into the skin of other agents incorporated into the ointment. The keratolytic effect is dependent upon the concentration of salicylic acid. Tar promotes normal keratinization.

beidellite, calcium carbonate, volcanic glass, quartz, mica and manganese carbonate. Chemically, it is similar to kaolin, but it differs physically in that the particles are finer, giving more surface area for adsorption. Bentonite has the property of forming highly viscous suspensions or gels with not less than 10 times its weight of water. Calcium hydroxide combines with proteins present in serous discharges from the skin to form a protective coating on the surface.

Calamine Liniment (emulsion)

Calamine	80 Gm
Zinc oxide	80 Gm
Olive oil	500 ml
Calcium hydroxide solution to make	1,000 ml

Calamine liniment is a water-in oil emulsion containing the same proportion of calamine and zinc oxide represented in the formula for calamine lotion. Because of its oil content the liniment is less drying than the lotion.

Adjuncts ■ 5–1% phenol may be added to enhance antipruritic effect. Even though phenol is absorbed through the skin, most of it is rapidly detoxified. However, large denuded areas should not be exposed to prolonged contact with preparations containing phenol. 0.5–1% salicylic acid may be added for a mildly keratolytic effect. To combat infection, antibiotics may be incorporated, singly or in combination, in the following concentrations: bacitracin 100–200 units/ml or neomycin 2 mg/ml.

Schamberg's Lotion

Menthol	0.25%
Phenol	1.0%
Peanut oil	45.0%
Calcium hydroxide solution	45.0%
Zinc oxide powder	8.0%

Wise's Shake Lotion

Aluminum acetate	12.5%
Glycerin	20.0%
Talcum powder	25.0%
Zinc oxide	25.0%
Calcium hydroxide solution	17.5%

Chemotherapeutic Drugs

IN THE PAST 15 years there has been a great increase in the number of agents available to treat infections. Concomitant with this productivity has been a tendency to use chemotherapeutic agents generously, sometimes loosely. Frequently this has resulted in emergence of resistant organisms and occasionally in "super-infections," such as systemic candidiasis (moniliasis) or staphylococcal enterocolitis. In this section will be described commonly used antibiotics. Some of them are prepared as special salts which increase gastrointestinal absorption. Many are available in mixtures, but only the individual drugs will be presented here. A few combinations for the treatment of staphylococcal infections will be suggested. On occasion, for resistant staphylococci, one may have to resort to systemic administration of neomycin or bacitracin, although usually these drugs are used topically because nephrotoxicity may result from parenteral administration. Because of the large number of patients having infections caused by strains of staphylococci resistant to several antibiotics, it is most important, when possible, to obtain cultures and sensitivity tests of material from the active lesions. After the culture material has been obtained, antibiotic therapy may be started. In two or three days, when results of sensitivity tests are known, it can be decided whether the originally prescribed antibiotic should be continued or one or 2 other antibiotics substituted. Whenever possible, incisional drainage should be carried out.

The chemical structures of the various groups of antibiotics differ greatly from one another. However one characteristic common to all is that their structures are found in micro-organisms but not in animal tissues. Perhaps it is this property that makes chemotherapy possible. The chemical structures of the various groups of antibiotics are as follows:

- of amino acid type
- modified amino acid type
- nitro group

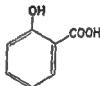
The following ointments, available on prescription, are applied to the involved areas 2 to 4 times daily to relieve pruritus and to keep the skin free from excess surface keratin

Antipruritic Ointment

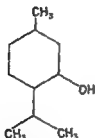
Phenol*	0.5-1%
Menthol	0.25%
Salicylic acid	0.5-1%
Tar (LCD, Zetar, etc.)	
In a water washable base	



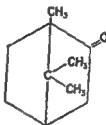
Phenol



Salicylic acid



Menthol



Camphor

Phenol is a distillation product of coal tar, or it may be synthesized from benzene. Menthol is an alcohol obtained from mint oil or prepared synthetically. Camphor is a ketone obtained from the camphor tree, *Cinnamomum camphora*, an evergreen of eastern Asia, or produced synthetically from fractional distillation of turpentine.

Lubricating Ointment

Salicylic acid	1%
In Nivea, Eucerine or other W/O base	

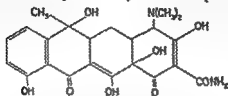
The salicylic acid concentration can be varied from 0.5 to 3%

*Camphor 0.5-1% may be substituted

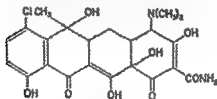
FOR ORAL AND PARENTERAL USE

Tetracyclines

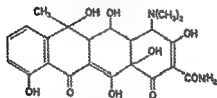
Like most antibiotics, the tetracyclines are derived from fungi of the Actinomycetes family and the Streptomyces genus.



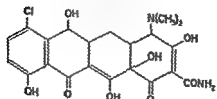
Tetracycline
(Achromycin, Panmycin, Polycycline, Tetracyn)



Chlorotetracycline
(Aurocomycin)



Oxytetracycline
(Terramycin)



Demethylchlorotetracycline
(Declomycin)

animal tissues. The polypeptide antibiotics, bacitracin, polymyxin, gramicidin and tyrocidine, contain both D and L amino acids. Animal cells contain only amino acids of the L series. The tetracyclines have a naphthacene ring system that may be considered to consist of modified amino sugars. New types of amino sugars also are found in streptomycin, kanamycin, neomycin, novobiocin, erythromycin and oleandomycin.

Under each antibiotic the commonly used names of the susceptible micro-organisms will be given. The common names and their technical counterparts are as follows:

GRAM-POSITIVE BACTERIA

I. *Cocci*

- Staphylococcus
(*Micrococcus pyogenes* var
aureus, albus)
- Streptococcus
(*Streptococcus pyogenes*,
beta hemolytic streptococci)
- Pneumococcus
(*Diplococcus pneumoniae*)

II. *Bacilli*

- Anthrax
(*Bacillus anthracis*)
- Clostridia
(*Clostridium perfringens*,
tetani, etc.)
- Diphtheria
(*Corynebacterium diph-*
theriae)

GRAM NEGATIVE BACTERIA

I. *Cocci*

- Gonococcus
(*Neisseria gonorrhoeae*)
- Meningococcus
(*Neisseria intracellularis*)

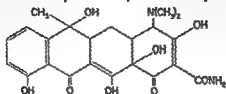
II. *Bacilli*

- Proteus
(*Proteus vulgaris*)
- Pyocyanus or Pseudomonas
(*Pseudomonas aeruginosa*)
- E. coli
(*Escherichia coli*)
- Hemophilus
(*Hemophilus ducreyi*,
influenzae, etc.)
- Brucella
(*Brucella abortus*, etc.)
- Aerobacter
(*Aerobacter aerogenes*)
- Friedländer's bacillus
(*Klebsiella pneumoniae*)
- Pasturella
(*Pasturella pestis*, tularensis)
- Salmonella
(*Salmonella typhosa*, etc.)
- Shigella
(*Shigella dysenteriae*, etc.)
- Bacteroides

FOR ORAL AND PARENTERAL USE

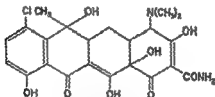
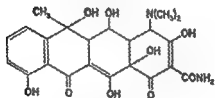
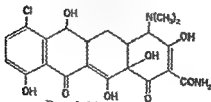
Tetracyclines

Like most antibiotics, the tetracyclines are derived from fungi of the Actinomycetes family and the Streptomyces genus.



Tetracycline

(Achromycin, Panmycin Polycycline, Tetracycline)

Chlorotetracycline
(Aureomycin)Oxytetracycline
(Terramycin)Demethylchlorotetracycline
(Declomycin)

Antibiotic spectrum Gram-positive and gram negative bacteria, large viruses such as those causing psittacosis, lymphopathia venereum, etc., rickettsiae, *Endamoeba histolytica*, *bacteroides*. Tetracycline, chlorotetracycline and oxytetracycline are not effective against *proteus* and *pyocyaneus* although some strains of these bacteria may be susceptible to demethylchlorotetracycline

Mode of action Bacteriostatic through interference with microbial protein synthesis or with cellular oxidative metabolism

Dose Adults—250–500 mg 4 times daily orally

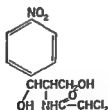
Children—25 mg/kg of body weight daily orally

The dose of Declomycin is $\frac{1}{2}$ that given for the other three tetracyclines

Side effects Skin reactions, such as urticaria and pruritic, erythematous, papular eruptions, nausea, vomiting, diarrhea, candidiasis

Chloramphenicol (Chloromycetin)

Although chloramphenicol was first obtained from *Streptomyces venezuelae*, it is now produced synthetically. Of the four isomers of chloramphenicol, only the natural D threo form is active, and this is the one that is made synthetically. It is effectively absorbed from the gastrointestinal tract, and practically none is excreted in the feces.



Chloramphenicol
(Chloromycetin)

Antibiotic spectrum Gram positive and gram negative bacteria (especially staphylococci and *Salmonella typhosa*), large

viruses such as those causing psittacosis, lymphopathia venereum, etc., rickettsiae

Mode of

Dose

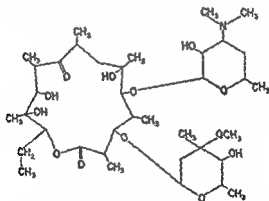
Side effects Skin reactions such as urticaria, nausea, vomiting, diarrhea, blood dyscrasias, sometimes associated with fever

Erythromycin (Erythrocin, Ilotycin)

This drug produced by *Streptomyces erythreus*, frequently used for staphylococcal infections, especially

phenicol, which is used

Micrococcus pyogenes var *aureus* the purpose of erythromycin (Ilosone) may be a more effective form of this drug for oral use



Erythromycin
(Erythrocin, Ilotycin)

Antibiotic spectrum Gram positive bacteria (especially staphylococci), gonococcus, meningococcus, hemophilus, large viruses such as those causing psittacosis, lymphopathia venereum, etc., rickettsiae

Mode of action Erythromycin seems to act against multiplying bacteria. It is bacteriostatic against staphylococci.

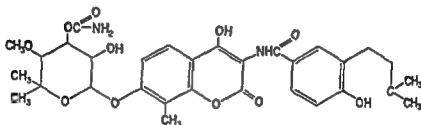
Dose Adults—250–500 mg 4 times daily orally

Children—5 mg /lb of body weight 4 times daily

Side effects Occasionally mild gastrointestinal upsets

Novobiocin (Albamycin, Cathomycin)

This antibiotic, produced by *Streptomyces niveus*, is used chiefly for infections caused by staphylococci resistant to other antibiotics and for urinary tract infections caused by strains of proteus.



Novobiocin
(Albamycin, Cathomycin)

Antibiotic spectrum Gram-positive bacteria (especially staphylococci), proteus

Mode of action Bacteriostatic. May be bactericidal in high concentration.

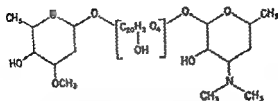
Dose Adults—1 Gm initially followed by 250–500 mg 4 times daily orally

Children—15–45 mg /kg of body weight daily orally

Side effects Reversible leukopenia, erythematous, papular and urticarial skin eruptions, fever

Oleandomycin (Matromycin, or the triacetyl derivative Cyclamycin, Tao)

This antibiotic, isolated from *Streptomyces antibioticus*, is of questionable value in infections caused by staphylococci resistant to other antibiotics.



L-OLEANDROSE

DESOSAMINE

Oleandomycin
(Matromycin, Cyclamycin, Tao)

Antibiotic spectrum Gram positive bacteria, gonococcus, meningococcus, brucella, Hemophilus influenzae

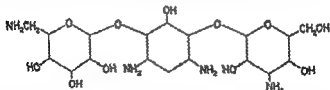
Mode of action Weakly bactericidal and bacteriostatic.

Dose Adults—250–500 mg 4 times daily orally

Children—30 mg/kg of body weight orally daily

Kanamycin (Kantrex)

This antibiotic, isolated from *Streptomyces kanamyceticus*, is structurally similar to neomycin and streptomycin. It has the unusual property of being stable indefinitely at room temperature. Being a water soluble basic substance which is poorly absorbed from the intestinal tract, it is given orally for intestinal infections but must be given intramuscularly when systemic therapy is required. It is used for the treatment of infections caused by staphylococci resistant to other antibiotics.



Kanamycin
(Kantrex)

Antibiotic spectrum Gram positive and gram negative bacteria (especially staphylococci)

Mode of action Bactericidal

Dose Adults—3–4 Gm orally or 1–2 Gm intramuscularly in equally divided doses daily

Children—50 mg/kg of body weight orally or 15–30 mg/kg intramuscularly in 2 to 4 equally divided doses daily

Side effects Renal irritation evidenced by casts, microscopic hematuria and albuminuria may follow intramuscular administration. These signs are reversible. Auditory damage sometimes occurs after high and prolonged intramuscular dosage. Kanamycin is contraindicated in intestinal obstruction.

Ristocetin A and B (Spontin)

Ristocetin A and B, antibiotics isolated from the actinomycete, *Nocardia lurida*, are polysaccharides composed primarily of pentose units. Both compounds have molecular weights of about 4,000 and are relatively stable. They are amphoteric substances with isoelectric points near pH 8. The acidic properties are due to phenolic groups, and the basic properties are due to amino groups. Hydrolysis yields the four sugars glucose, mannose, arabinose and rhamnose and a mixture of amino acids. These two classes of substances account for the bulk of the ristocetin molecule. The phenolic groups are associated with the amino acids. The difference between ristocetin A and B appears to be primarily in the proportions of the sugars. There is more arabinose in ristocetin A than in B. In animals, ristocetin B is a more potent antimicrobial agent than A, but it is also more toxic. A mixture of approximately 95% ristocetin A and 5% ristocetin B is available under the name of Spontin. It is given intravenously for the treatment of infections due to gram positive bacteria, particularly staphylococci.

Antibiotic spectrum Gram positive bacteria (especially staphylococci)

Mode of action It is bactericidal in the same concentration that it is bacteriostatic.

Dose Spontin must be given intravenously in 5% dextrose in water. Total daily dose 25–50 mg/kg of body weight divided into 2 to 3 portions and given at 8–12 hour intervals. Each intravenous infusion is given over a 35–40 minute period. For 250 mg Spontin, 125 ml of 5% dextrose is used. Spontin is irritating if deposited in extravascular tissue.

Side effects Dermatitis, fever and reversible leukopenia with a relative neutropenia occur. Frequent white cell counts should be done during the period of Sponston therapy.

Vancomycin (Vancocin)

This drug isolated from *Streptomyces orientalis*, is used for the treatment of staphylococcal infections, especially those resistant to other antibiotics. Vancomycin must be given intravenously because little is absorbed from the gastrointestinal tract and because intramuscular injections are painful. The chemical structure of vancomycin is not known. This antibiotic has a molecular weight of about 3,300. It contains carboxyl, amino and phenolic groups.

Antibiotic spectrum Gram positive bacteria

Mode of action Bactericidal

Dose Adults—500 mg intravenously every 6 hours or 2 Gm daily by continuous infusion. A vial containing 500 mg vancomycin is diluted to 100-200 ml with saline or 5% glucose in water. This solution is given intravenously over a 20-30 minute period.

Side effects Urticaria, macular eruptions, fever, nausea, feeling of warmth and generalized tingling have occurred.

Penicillin

When various chemicals are added to the culture medium, different penicillin antibiotics are produced by strains of *Penicillium notatum* and *Penicillium chrysogenum*. Chemically it is possible to classify the penicillins with polypeptide antibiotics because they can be considered derivatives of a condensed dipeptide. The chemical structures of seven of the penicillins are given in the diagram where the letter R of the penicillin molecule can be any of the chemical groups to the right of G, X, V, F, dihydro F, K, or O. The most widely used form is penicillin G. Recently a new type of penicillin (Syncillin, Maxipen) has been made by a combination of fermentation and chemical addition. 6-amino-penicillanic acid is made by biosynthesis and then an α -phenoxyethyl group is added chemically. This new penicillin is similar to penicillin V which has an α -phenoxymethyl instead of an α -phenoxyethyl group. The

Children—50 mg/kg of body weight orally or 15-30 mg/kg intramuscularly in 2 to 4 equally divided doses daily

Side effects Renal irritation evidenced by casts, microscopic hematuria and albuminuria may follow intramuscular administration. These signs are reversible. Auditory damage sometimes occurs after high and prolonged intramuscular dosage. Kanamycin is contraindicated in intestinal obstruction.

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Antibiotic spectrum Gram positive bacteria (especially staphylococci)

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Antibiotic spectrum Gram positive bacteria, gonococcus, meningococcus, spirochetes, Actinomyces bovis, large viruses such as those causing psittacosis, lymphopathia venereum etc.

Penicillin is the drug of choice in infections due to beta hemolytic streptococci or pneumococci. Because of its inherently low toxicity penicillin may be given in very high doses for staphylococcal infections.

Mechanism of action Penicillin inhibits bacteria during the growth phase. This action results in part because penicillin prevents synthesis of bacterial cell walls and these walls differ chemically from the outer walls of animal cells. The cytoplasm of a gram positive bacterium lies within a fragile membrane which is surrounded by a rigid wall. The cytoplasm has high osmotic activity, but the cell is prevented from bursting by the strength of the wall. The walls of staphylococci contain a large molecule made up of D and L alanine, D glutamic acid, lysine, glycine, glucosamine and the N acetyl derivative of an amino sugar 3-O-carboxyethyl hexosamine. In the growing—but not the resting—phase penicillin prevents the incorporation of the N-acetylamino sugar peptide fragment into new cell wall material. Thus penicillin treated bacterial cells grow normally but they soon fail to have enough cell wall to go around. The inadequate wall can no longer protect the cytoplasmic membrane and the cell bursts.

Dose Penicillin has been standardized so that pure crystalline penicillin G contains 1 unit/0.6 µg. Hence 1 mg is equivalent to 1,667 units. Commercial preparations are required to have a potency of not less than 1,500 µ/mg. 600 mg is equivalent to 1,000,000 units.

TREATMENT OF SKIN INFECTIONS CAUSED BY PENICILLIN SENSITIVE ORGANISMS

Intramuscular 300,000–600,000 units procaine penicillin daily for 10 days. Or 600,000 units long acting benzathine penicillin (Bicillin) once. Adequate blood levels will be maintained for 10 days.

Oral 800,000–1,200,000 units daily in 3 to 4 divided doses.

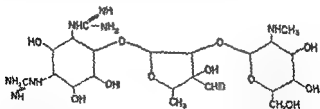
Dose 800,000 units of penicillinase (contents of 1 vial reconstituted with 2 ml of water) intramuscularly is usually sufficient to cause subsidence of the penicillin reaction within 24-48 hours. For severe and protracted reactions, usually associated with depot preparations, a second injection may be needed in 3 to 4 days. Steroids and antihistamines should be used concomitantly if necessary. Penicillinase does not have time to be effective in acute anaphylactic reactions which cause death within minutes.

Side effects Fever, morbilliform eruptions, urticaria, local swelling and erythema at site of injection, and anaphylactic reactions may occur.

Available as Neutrapen (SchenLabs) in single dose vials containing 800,000 units. One unit of penicillinase is defined as that amount which would inactivate 1 unit of penicillin per minute.

Streptomycin

Streptomycin is an antibiotic discovered in cultures of the actinomycete *Streptomyces griseus*. Dihydrostreptomycin is obtained by catalytic hydrogenation of streptomycin. Its antibacterial spectrum and potency are similar to the parent material, but it is more stable, evokes fewer hypersensitivity reactions and causes less vertigo but more deafness than streptomycin.



Streptomycin

Antibiotic spectrum Gram-negative bacteria, *Mycobacterium tuberculosis*

Mechanism of action Streptomycin combines with nucleic

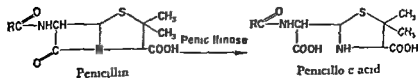
TREATMENT OF SYPHILIS

Primary, secondary, latent and late (all types except neurosyphilis) and syphilis during pregnancy 600 000 units procaine penicillin intramuscularly daily except Saturday and Sunday for 10 injections Total dose, 6,000 000 units For neurosyphilis increase number of injections to 15 Total dose, 9,000,000 units

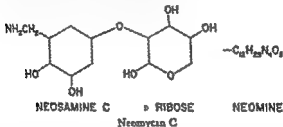
Long acting penicillin (Bicillin) has been tried in single doses of 2.4 or 4.8 million units The long term efficacy of this is not known yet

Side effects Different types of allergic reactions occur following administration of penicillin The most common include eczematous eruptions, pruritus, urticaria and exfoliative dermatitis A delayed serum sickness type of sensitization may supervene Anaphylactoid reactions sometimes occur shortly after administration Fatal reactions have been reported The best treatment of acute anaphylactoid reactions is injection of epinephrine Parenteral antihistamines also may be helpful

Treatment of Penicillin Reactions with Penicillinase—Sensitivity reactions to penicillin may be treated with steroids or antihistamines A new type of treatment has been developed using penicillinase, an enzyme that inactivates penicillin Penicillinase is found in *B. cereus*, *E. coli* and many strains of staphylococci Commercial penicillinase is produced from *B. cereus* The enzyme catalyzes the hydrolysis of the lactam ring in penicillin to produce penicilloic acid which has no antibiotic activity and apparently is nonallergenic After exposure to penicillinase, penicillin can no longer elicit a hypersensitivity response In the experimental animal penicillinase acts as an antigenic substance



neomycin A was merely a degradation product of B, and it also was found that neomycin B could be separated into two isomeric substances. Hence two neomycins are available called neomycin B and neomycin C. They are fairly stable compounds and can be used in aqueous solution if desired. Chemically, parts of the molecule are similar to groupings in streptomycin and kanamycin. Neomycins B and C contain the base neamine as half the molecule. The other half is made up of D ribose and a diaminohexose—neosamine B or C.



Antibiotic spectrum : Gram positive and gram negative bacteria

Side effects Although neomycin is very useful because of its stability and wide range of action, it has 2 important disadvantages (1) topical application may result in a contact type sensitization reaction, (2) the bacterial flora of the skin, particularly when neomycin is applied to body folds and orifices is reduced so much that candidal growth is enhanced and severe candidiasis may result.

Bacitracin

The bacitracin antibiotics which are obtained from a strain of *Bacillus licheniformis*, are polypeptides made up of D and L amino acids. All contain sulfur. The isolation and characterization of the bacitracins have been extremely difficult. The main polypeptide bacitracin A, consists of 12 amino acids arranged as shown in the structural formula.

A thiazoline ring is present. Bacitracin A probably can exist in tautomeric forms. Under certain conditions bacitracin A

acids and nucleoprotein. It inhibits the oxidation of ribose nucleic acid and the action of diamine oxidase. It is difficult to tell whether these changes are the main ones responsible for the action of streptomycin.

TOPICAL ANTIBIOTICS

Several of the antibiotics already discussed are available for topical use, e.g., the tetracyclines, erythromycin and chloramphenicol. Others, such as penicillin and streptomycin, are too sensitizing to be of value topically. In this section neomycin, bacitracin, polymyxin and gramicidin will be described. These substances have the advantage of not ordinarily being used systemically so that the chances of unnecessarily sensitizing a patient to an antibiotic that he may require at a later date are reduced. In general, preparations containing combinations of these antibiotics, such as Neosporin, Spectrocin and Neo-Polycin, are of greatest effectiveness. Chemotherapeutic agents which are not antibiotics are available, such as Vioform, Sterosan and Furacin. These substances often are not as effective as the antibiotics or, as in the case of Furacin, are more sensitizing.

In this section only three commercially available antibiotic ointments and lotions are listed. Many others are available. These preparations are effective against gram positive and gram negative organisms and are particularly useful for the treatment of staphylococcal infections. They should be applied to the skin 2 to 3 times daily. In some cases of recurrent staphylococcal infections of the skin it is advisable to apply the antibiotic to the nasal mucous membranes twice daily for 2 weeks in order to eliminate transfer of infection from the nose to the skin via the hands.

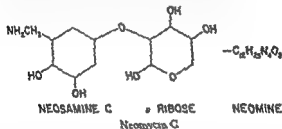
Neomycin

Neomycin was first isolated in 1952 by Waksman and his associates.

Several years ago crude neomycin was separated into 2 products, neomycin A and B. Subsequently it was found that

neomycin A was merely a degradation product of B and it

and can be used in aqueous solution if desired. Chemically parts of the molecule are similar to groupings in streptomycin and kanamycin. Neomycins B and C contain the base neamine as half the molecule. The other half is made up of D ribose and a diaminoheptose—neosamine B or C.



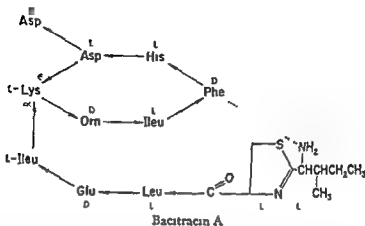
Antibiotic spectrum Gram positive and gram negative bacteria.

Side effects Although neomycin is very useful because of its stability and wide range of action it has 2 important disadvantages: (1) topical application may result in a contact type sensitization reaction; (2) the bacterial flora of the skin, particularly when neomycin is applied to body folds and orifices, is reduced so much that candidal growth is enhanced and severe candidiasis may result.

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A thiazoline ring is present. Bacitracin A probably can exist in tautomeric forms. Under certain conditions bacitracin A



can be transformed through internal rearrangement and the loss of ammonia into bacitracin F. Bacitracin B is less stable and appears in smaller quantities than bacitracin A. It contains all the amino acids present in A plus valine. Bacitracin B can exist in at least 2 different forms on the basis of rearrangement of some of the amino acids present.

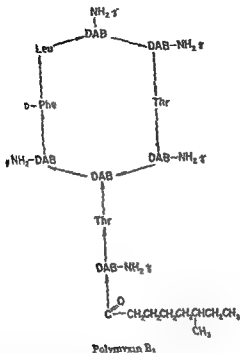
Antibiotic spectrum Gram positive bacteria. Inactive against gram negative bacteria except gonococcus and meningococcus.

Mode of action The antibiotic activity and mechanism of action of the bacitracins are similar to those of the penicillins.

Polymyxin

The polymyxins are antibiotics formed by different but closely related strains of *Bacillus polymyxa*. All the polymyxins, A, B, C, D and E, are basic cyclic peptides containing α , γ -diaminobutyric acid and a fatty acid. The antibiotics polymyxin and circulin belong to the polymyxin group. Polymyxin B can be separated into polymyxin B₁ and B₂. Polymyxin B₁ contains isopelargonic acid, which is present in all the polymyxins except B₂ and polypeptin. B₂ contains an acid which is similar but which has one less carbon atom. The preparation used commercially is polymyxin B sulfate.

Antibiotic spectrum Gram negative bacteria, including *pyocyaneus*, but not *proteus*.

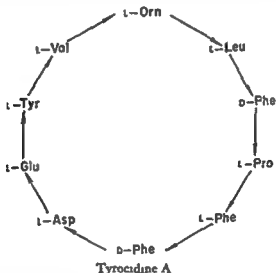


DAB = α, γ diamminobutyric acid All the amino acids except phenylalanine are in the L form

Tyrothricin, Gramicidin and Tyrocidine

Tyrothricin, isolated from *Bacillus brevis* can be separated into 2 groups of polypeptides gramicidin and tyrocidine. Gramicidin represents about 10-20% of the mixture and is in turn made up of at least 4 different closely related peptides. The 3 major ones are called gramicidin A, B and C. The complete structures of the gramicidins have not been worked out. They are cyclic peptides made up of 30-40 amino acid residues. B differs from A by the replacement of 2 tryptophane residues with phenylalanine. C contains at least one tyrosine, but this amino acid is not present in A and B.

The tyrocidine group has been resolved into the individual peptides A, B and C. Tyrocidine A is made up of 10 amino acids in a cyclic arrangement as shown in the diagram. Tyrocidine B differs from tyrocidine A in that the L phenylalanine residue between L proline and D phenylalanine is replaced by L-tryptophane. Gramicidin S belongs to the tyrocidine class and can be separated into at least 4 different peptides. The major peptide, gramicidin S A, contains 10 amino acids in a ring arrangement with a repeating pentapeptide. This pentapeptide has the same sequence as half of the tyrocidine molecule.



Antibiotic spectrum Gram positive bacteria

Neosporin (Burroughs Wellcome)

OINTMENT

Each gram contains

Polymyxin B sulfate	5 000 units
Zinc bacitracin	400 units
Neomycin sulfate	3.5 mg (as base)

Standardization

1 mg polymyxin B sulfate	contains 10 000 units
1 mg bacitracin A	contains 70-80 units

Available in 15 and 30 Gm tubes

Lotion

Each milliliter contains

Polymyxin B sulfate	10,000 units
Neomycin sulfate	3.5 mg (as base)
In a water washable base	

Available in 20 ml plastic bottles.

Spectrocin (Squibb)

Each gram of ointment or milliliter of lotion contains

Gramicidin	0.25 mg
Neomycin sulfate	2.5 mg (as base)

Available in 15 and 30 Gm tubes of ointment and 15 ml bottles of lotion

Neo-Polycin (Pitman Moore)

Each gram of ointment contains

Polymyxin B sulfate	8,000 units
Zinc bacitracin	400 units
Neomycin	3 mg (as base)

Available in 15 Gm tubes.

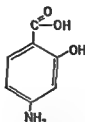
TUBERCULOSIS OF THE SKIN

For - 2 - - - - -

Streptomycin has been discussed previously (p. 49)



Isonicotinic acid hydrazide
(Isoniazid—Nydrand, Squibb, Rimfon, Roche)



Para aminosalicylic acid
(PAS)

Mechanism of action Isoniazid acts specifically against the tubercle bacillus and is sometimes effective against *Mycobacterium lepraemurium*. It is inactive against other microorganisms. The tubercle bacillus loses its acid fastness when exposed to isoniazid. Isoniazid also delays the emergence of resistant organisms. Ordinarily this drug is bacteriostatic but it can be given in sufficient concentrations to be bactericidal. With isoniazid there is resolution of tubercles with minimal histiocytic activity.

PAS inhibits the growth of tubercle bacilli but has little or no effect on other bacteria. PAS is not used by itself but in conjunction with streptomycin and/or isoniazid. In combination, PAS delays emergence of resistant strains of tubercle bacilli.

Dose Isoniazid alone—100 mg 3 times daily

Streptomycin with isoniazid—streptomycin 1 Gm intramuscularly twice weekly, isoniazid 100 mg 3 times daily

PAS with isoniazid—PAS 4 Gm 3 times daily at meal time, isoniazid 100 mg 3 times daily

Side effects Isoniazid—constipation, difficulty in starting micturition, orthostatic hypotension, eosinophilia, anemia, albuminuria

PAS—dermatitis and local irritation of the gastrointestinal tract consisting of anorexia, nausea, vomiting and diarrhea

Available as isoniazid tablets 50 and 100 mg each and syrup 10 mg/ml. PAS available in 0.5 Gm tablets or capsules as the acid or as the calcium or sodium salt and in powder form

SULFONAMIDES

The sulfonamides are of limited use in infections of the skin due to gram positive bacteria and gram negative cocci. Some physicians use them for the treatment of acne vulgaris. It must be pointed out that when the sulfonamides are given ultraviolet light therapy must be restricted because of the possibility of photosensitization reactions. The sulfonamides also are used for lymphopathia venereum, trachoma and inclusion blennorrhoea. Sulfapyridine has been recommended for the treatment of dermatitis herpetiformis. All the sulfonamides without exception can produce dermatitis as a result of a hypersensitivity reaction.

1. TRIPLE SULFONAMIDES

Mixed sulfonamides are more soluble than single ones because each sulfonamide has a solubility independent of the others present, thus decreasing the possibility of precip-

sulfadiazine and sulfamerazine

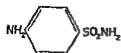
Terfonyl (Squibb) contains in each 0.5 Gm. tablet or 5 ml. of suspension 0.167 Gm. each of sulfamethanone, sulfadiazine and sulfamerazine.

Tresamide (Merck) contains in each 0.5 Gm. tablet 0.1 Gm. of sulfamerazine, 0.2 Gm. of sulfadiazine and 0.2 Gm. of sulfathiazole.

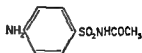
Other triple sulfonamide preparations also are available.

2. **GANTRISIN** (Roche) is highly soluble in neutral and acid solutions.

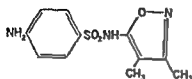
3. **LYNEX** (Lederle) is highly soluble and yet is excreted slowly by the kidney. For this reason a daily maintenance dose of 0.5 Gm. is all that is necessary. In approximately 15% of patients receiving Lynex dermatitis develops. Drug



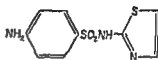
Sulfanilamide



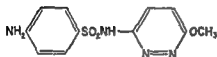
Sulfacetamide



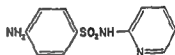
Gantisin



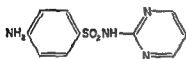
Sulfathiazole



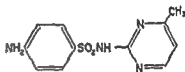
Lynex



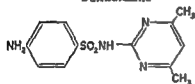
Sulfapyridine



Sulfadiazine



Sulfamerazine



Sulfamethazine

Mechanism of action In general, bacteriostatic but may be bactericidal when present in high concentrations. Sulfonamides act partly by displacing para aminobenzoic acid required for growth of bacteria. It is possible that in some skin disorders the therapeutic effect of sulfonamides results from a direct metabolic action rather than an antimicrobial

one For example, sulfapyridine benefits some patients with dermatitis herpetiformis, yet this disease has not been shown to be of infectious etiology

Dose Adults—1 Gm (2 tablets) by mouth 4 to 6 times daily

The dose of kynex is 0.5 Gm once daily

Children—60 mg/lb of body weight per 24 hours divided into 4 to 6 oral doses

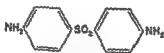
Side effects A variety of dermatologic eruptions—eczematous dermatitis urticaria fixed drug eruptions, photosensitization etc—and many systemic side effects, such as fever, renal and hepatic toxicity etc, may occur

Available in 0.5 Gm tablets

SULFONES

The sulfones are related chemically to the sulfa drugs. In general they are more effective than the sulfa drugs both in vitro and in vivo. However their greater toxicity limits their clinical usefulness. The sulfones are used primarily in the treatment of leprosy. They also are used in dermatology to treat dermatitis herpetiformis and subcorneal pustular dermatosis. Since most of the sulfones are metabolized to the parent compound diaminodiphenylsulfone and since this compound is less toxic than the others, it is the only one that will be considered.

Avlosulfon (Ayerst)



Avlosulfon
(Dapsone DDS, 4,4'-Diaminodiphenylsulfone)

Dose 50 to 150 mg daily according to the severity of symptoms and response of the patient. If medication is continued for several months or years it should be given for 6 days each week allowing 1 day's rest.

Available in 100 mg tablets

Side effects Early transient side effects are cyanosis, pallor, methemoglobinemia or sulfhemoglobinemia. They are not an indication for withdrawal of the drug unless associated with symptoms of anoxemia. Nausea, vomiting, headache, giddiness, tachycardia, psychosis, anemia, fever and exfoliative dermatitis may occur. Suppression of the white blood cell count rarely happens, but it is necessary to do white cell counts at regular intervals.

Cosmetics

Hypoallergenic Cosmetics

Many people are allergic to powder, rouge, lipstick, cream etc. Cosmetics which contain a minimal amount of allergenic substances are produced by the following companies: Almay, Ar-Ex, Marcelle, Texas Pharmacal. Some of these companies will supply a testing kit to help identify a cosmetic ingredient that may be causing a contact dermatitis. In addition they will prepare for individual needs special cosmetics minus the offending agent.

Opaque Covering

Tinted, opaque cosmetics are needed to cover disfiguring lesions such as hemangiomas, scars and pigmentary defects. One company, Lydia O'Leary, manufactures a variety of agents of this type under the names of Covermark and Spotsuk.

Enzymic Debridement

PROTEOLYTIC ENZYMES can be used to debride surfaces covered with necrotic tissue and pyogenic membranes as in chronic skin

ulcers, burns with eschar formation, infected wounds, abscesses, etc. The effectiveness of enzymic debridement depends upon the destruction and removal of necrotic tissue at a more rapid rate than removal of normal viable tissue. Different enzyme preparations are available in solutions and in ointments. The enzymes are trypsin, chymotrypsin, papain, streptokinase and streptodornase.

Trypsin catalyzes hydrolysis of peptide bonds after the basic amino acids lysine, arginine and histidine. Chymotrypsin catalyzes hydrolysis of peptide bonds after the aromatic amino acids phenylalanine, tyrosine and tryptophan. Papain catalyzes the cleavage of peptide bonds in a relatively nonspecific manner. Streptokinase activates the factor present in plasma which causes fibrinolysis. Streptodornase causes the breakdown of deoxyribonucleoprotein present in purulent exudates.

Solutions containing enzymes should be made up just before use since they are stable for only a few hours at room temperature.

Tryptar (Armour)

Tryptar is the purified crystalline enzyme, trypsin, derived from mammalian pancreas. Tryptar loses 75% of its activity in 3 hours in solution at room temperature and hence must be freshly prepared at maximum intervals of 3 hours. The potency of the enzyme powder is reduced even more rapidly in the presence of exuding serum. The lesion should be exposed to the enzyme until clearance of necrotic debris is accomplished.

Application (1) When the lesion is moist, sprinkle on dry powder and allow powder to remain for 30 minutes. Then wash off and mechanically debride loosened matter. Repeat several times daily until all necrotic tissue disappears and clean surface remains.

(2) When the lesion is dry, apply sterile gauze sponges moistened with Tryptar solution, which has been prepared immediately before use by dissolving Tryptar powder in 15-25 ml. water or saline.

Available in 10, 20 and 30 ml. vials containing 50,000, 125,000 and 250,000 units, respectively.

Tryptar Ointment (Armour)

Each gram of this preparation contains

Trypsin	5,000 units
Chymotrypsin	5,000 units
Polymyxin	5,000 units
Bacitracin	500 units
In an ointment base	

*Tryptar ointment combines proteolytic and antibacterial actions.
Available in 15 Gm tubes*

Varidase (Lederle)

Varidase is an enzymic mixture of streptokinase, the fibrinolytic principle, and streptodornase, the factor which liquefies purulent exudates, obtained from streptococci. Streptokinase is an enzyme activator with maximum activity at pH 7.3-7.6. Streptodornase, a desoxyribonuclease, consists of a series of closely related enzymes.

Application Apply sterile gauze sponges, moistened with Varidase solution, to lesion. Reapply every 24 hours until desired effect is obtained.

Available for topical use in vials containing 100,000 units streptokinase together with 25,000 units streptodornase.

Varidase Jelly (Lederle)

Mix (1) one 125,000 unit vial of Varidase dissolved in 5 ml sterile water, (2) 15 ml of carboxymethylcellulose jelly. Final volume is 20 ml, with 5,000 units streptokinase and 1,250 units streptodornase per ml.

Application Apply jelly directly to the affected area and keep in situ with gauze or plastic bandages. Apply daily or more frequently but allow sufficient intervals to elapse between treatments to permit adequate enzymic action.

Available as a set containing 1 vial of Varidase and a 15 ml jar of 4.5% carboxymethylcellulose jelly.

Panafil Ointment (Rystan)

Papain powder	10%
Urea	10%
Chlorophyll	0.5%
In a hydrophilic base	

Papain is a proteolytic enzyme obtained from papaya, the fruit of the papaw or melon tree, *Carica papaya*. It is used commercially in the preparation of tenderized meat.

Application Apply directly to lesion and cover with gauze. Change dressing once or twice daily. Irrigate lesion with saline when redressing in order to remove debris.

Available in 1 oz and 4 oz tubes

Fungicidal and Fungistatic Agents

TREATMENT OF FUNGUS INFECTIONS is becoming increasingly hopeful with the advent of new agents for oral and parenteral use in addition to topical preparations. Antibiotics for treatment of specific groups of fungi are available, for example, amphotericin B, nystatin and griseofulvin.

TOPICAL AGENTS

If the infection is acute, wet dressings should be used initially. Ointments or liquids are applied to involved areas at bed time and upon arising in the morning. For low grade infections in which a moderate amount of perspiration is present, powder may be used during the day.

OINTMENTS

Sulfur salicylic ointment, Salusol, Tricholysin and triacetin preparations are fungistatic and fungicidal in vitro against the trichophyton, epidermophyton and microsporon groups of fungi. With the exception of triacetin, these same agents as well as Nystatin, Propion Gel and Gentia-Jel act against *Candida albicans* (monilia). Vioform and Stercor are useful to treat candidiasis (moniliasis) and mixed infections of fungi and gram positive bacteria. Many of these products

are available in combination with steroids and/or antibacterial antibiotics, such as neomycin

To obtain good clinical results it is necessary for the therapeutic agent to reach the fungus. This is often difficult when only topical agents are used to treat fungus infections of the scalp and nails. The ideal treatment for many of these infections is the use of an oral antifungal substance that may be incorporated into keratin as it is being formed.

Sulfur-Sal-Thymol Ointment

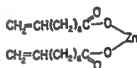
Sulfur	2.5%
Salicylic acid	1.3%
Thymol	0.5%
In Desenex ointment	



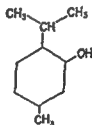
Undecylenic acid



Salicylic acid



Zinc undecylenate



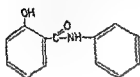
Thymol

Desenex ointment contains 5% undecylenic acid, 20% zinc undecylenate and 75% polyethylene glycol.
Available. Must be prepared on prescription.

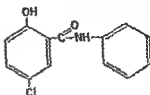
Salundek Ointment (Maltbie)

3%
4%
2%
10%

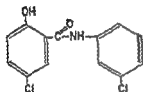
The 4% chlorosalicylanilides consist of 2% 5-chlorosalicylanilide 1% 3,3' dichlorosalicylanilide and 1% 5,4' dichlorosalicylanilide.



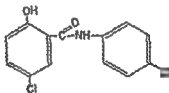
Salicylanilide



5 Chlorosalicylanilide



3,3' Dichlorosalicylanilide



5,4' Dichlorosalicylanilide

Available in 2 oz tubes.

Triacetin (Enzactin Ayerst Fungacetin, Harvey)

Glyceryl triacetate 25%
In a water-washable base



Triacetin
(Glyceryl triacetate)

In the presence of esterases, enzymes that occur in fungi, skin and serum triacetin is hydrolyzed to glycerin and acetic acid. The acetic acid liberated at the site of the fungus inhibits its growth. Esterases that can catalyze the hydrolysis of triacetin are not present in *Candida albicans*.

Available in 1 oz tubes.

Tricholysin (Kelgy)

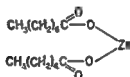
Zinc caprylate	5 %
Sodium caprylate	10 2%
Caprylic acid	1 2%
Normal propyl alcohol	10 %
In a water washable base	



Caprylic acid

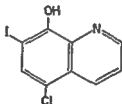


Sodium caprylate



Zinc caprylate

Available in 1 and 8 oz tubes

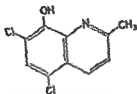
Vioform (Ciba)

Vioform
(5 Chloro 7 Iodo-8 hydroxyquinoline)

spermace, glycerin and petrolatum

Available in 50 Gm tubes of ointment or cream

Sterosan (Geigy)



Sterosan
(5,7-Dichloro-8-hydroxyquinoline)

Sterosan is available as 3% 5,7-dichloro-8-hydroxyquinoline in an ointment or vanishing cream base.
Available in 30 Gm. tubes of ointment or cream.

Nystatin (Mycostatin, Squibb)

Nystatin sold commercially as Mycostatin is the first effective antifungal antibiotic. Its antifungal properties were described in 1950. Nystatin is derived from a species of the actinomycete *Streptomyces noursei* which was found in soil from a dairy farm in Virginia owned by a Mr. Norris. In vitro it is effective against the following fungi: *Candida*, *Cryptococcus*, *Blastomyces*, *Histoplasma* and *Epidermophyton*. It is somewhat less effective against *Microsporum audouinii*, *M. canis* and *Trichophyton tonsurans*. It has no antibacterial action.

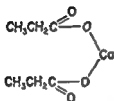
Nystatin is a water insoluble substance. It is a fairly large molecule composed of 40 carbon atoms. It has carboxyl, lactone and 11 hydroxyl groups and is bound through a glycoside linkage to a 6 carbon amino sugar unit. It is susceptible to inactivation by acidic or alkaline reagents, oxidation by air and decomposition by heat and light. Chemically, nystatin appears to be related to amphotericin A and B.

Available as Mycostatin ointment and cream 100,000 units/Gm. in 15 and 30 Gm. tubes. For vaginal infection, suppositories containing 100,000 units Mycostatin and 0.93 Gm.

lactose per tablet are available in packages of 15 tablets with vaginal applicator

Propion Gel (Wyeth)

Calcium propionate 10%
Sodium propionate 10%
In a water soluble base containing glycerin,
3% boric acid and tragacanth



Calcium propionate



Sodium propionate

Application Introduce ointment into vagina every morning and night for 3 weeks Apply small amount to external genitalia

Available in 95 Gm tubes with or without applicator

Gentia-Jel (Westwood)

Gentian violet 0.1%
Acetic acid 1%
Lactic acid 3%
In a water soluble polyethylene
glycol base



Acetic acid



Lactic acid

Application Insert jelly into vagina at bedtime nightly for 12 nights

Available in packages of 12 single-dose, prefilled disposable applicators

SOLUTIONS

Verdefam (Texas Pharmacal)

Sodium caprylate	2 %
Sodium propionate	2 %
Propionic acid	3 %
Undecylenic acid	5 %
Salicylic acid	3 %
Copper undecylenate	0.5 %
Sodium dioctylsulfosuccinate	0.1 %

In water and isopropyl alcohol

Available in 2 oz. bottles.

Safundek Solution (Maltbie)

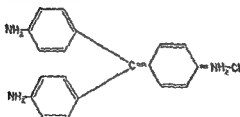
Salicylanilide	3%
Mono- and dichlorosalicylanilides	2%
Undecylenic acid	2%
Ethyl alcohol	55%

Available in 3 oz. bottles

Carfusin (Rorer)

This is carbol fuchsin or Castellani's paint.

Boric acid	1 %
Carbolic acid (phenol)	4.5 %
Resorcinol	10 %
Fuchsin	0.3 %
Acetone	1 %
In water	



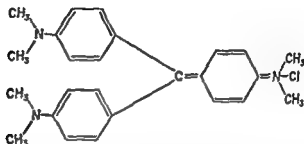
Fuchsin

Basic fuchsin or basic magenta ■ a mixture of rosaniline and pararosaniline hydrochlorides.

Available in 1 and 4 oz. bottles with applicator top

Gentian Violet

Gentian violet is used in a concentration of 0.5–2% in water or 70% alcohol



Gentian violet

(Methylrosaniline chloride, methyl violet, crystal violet)

Available Must be prepared on prescription

Caution Avoid staining clothing or other materials. To remove linen stains, wash with sodium carbonate and soap or alcohol.

Onychophytex (Wynlit)

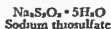
Borotannic complex	7.5%
Salicylic acid	0.8%
Ethyl alcohol	56%
Ethyl acetate (not specified)	

Borotannic complex is a condensation product made up of 29 parts of boric acid and 46 parts of tannic acid

This preparation has been used for fungus infections of the nails, especially those caused by members of the trichophyton group. Its value has not been proved.

Sodium Thiosulfate (sodium hyposulfite)

This is an aqueous solution containing 20% sodium thiosulfate which is used for treatment of tinea versicolor.



Application Apply to involved areas twice daily. Continue treatment for 2 to 3 months following disappearance of lesions to prevent recrudescence.

Available Must be prepared on prescription

POWDERS

Desenex (Maltbie)

Undecylenic acid	25%
Zinc undecylenate	20%
Talc	78%

Available in 1½ oz containers

Mycostatin Dusting Powder (Squibb)

This powder contains 100,000 units of nystatin/Gm. of talc base.

Available in ½ oz containers

Enzactin Powder (Ayerst)

This preparation contains 33⅓% glyceryl triacetate in a moisture-absorbent base.

Available in 1½ oz containers.

SYSTEMIC AGENTS

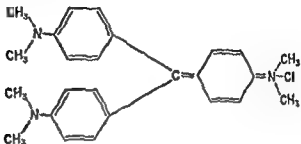
Amphotericin B (Fungizone, Squibb)

Amphotericin is a crystalline product obtained from a heretofore unidentified species of streptomyces found in South America. Two fractions, amphotericin A and B, may be separated on the basis of differing solubilities. Their chemical structure is still unknown. Amphotericin A is related chemically to nystatin. Amphotericin B is at present better developed, it is more toxic to animals, but its *in vivo* antifungal action is greater than that of amphotericin A, despite evidence to the contrary *in vitro*. The *in vitro* antifungal spectrum of amphotericin A and B includes *Candida albicans*, *Cryptococcus neoformans*, *Blastomyces dermatitidis*, *Blastomyces brasiliensis*, *Sporotrichum schenckii* and *Histoplasma capsulatum*. No antibacterial activity has been observed.

Amphotericin B is highly insoluble and is not absorbed through the gastrointestinal tract. A water soluble derivative

Gentian Violet

Gentian violet is used in a concentration of 0.5-2% in water or 70% alcohol



Gentian violet

(Methylrosaniline chloride, methyl violet crystal violet)

Available Must be prepared on prescription

Caution Avoid staining clothing or other materials. To remove linen stains, wash with sodium carbonate and soap or alcohol

Onychophytex (Wynlit)

Borotannic complex	75%
Salicylic acid	0.8%
Ethyl alcohol	56%
Ethyl acetate (not specified)	

Borotannic complex is a condensation product made up of 29 parts of boric acid and 46 parts of tannic acid

This preparation has been used for fungus infections of the nails, especially those caused by members of the trichophyton group. Its value has not been proved.

Sodium Thiosulfate (sodium hyposulfite)

This is an aqueous solution containing 20% sodium thiosulfate which is used for treatment of tinea versicolor.



Application Apply to involved areas twice daily. Continue treatment for 2 to 3 months following disappearance of lesions to prevent recrudescence.

Available Must be prepared on prescription

Oral Mycostatin therapy is used for intestinal candidiasis (moniliasis) and for severe candidiasis of the perineum in order to prevent reinfection from the intestinal tract. Mycostatin is highly insoluble. Because little is absorbed from the gastrointestinal tract, oral Mycostatin is of doubtful value for systemic candidiasis. No toxic effects are known.

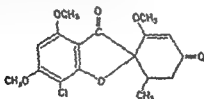
Dose 1 tablet 3 times daily

Available in bottles of 12 and 100 tablets, each tablet containing 500,000 units of nystatin, and as a suspension for infants, each cubic centimeter containing 100,000 units

Griseofulvin (Grifulvin, McNeil Fulvicin, Schering)

Griseofulvin is an antibiotic derived from various species of penicillium, e.g. *P. griseofulvum*, *P. palatum*, *P. janczewskii* and *P. raistrickii* Smith. Griseofulvin has been called the "curling

ing and distortion" antibiotic because it causes curling and distortion of keratin as it is formed in skin, hair and nails. The actual presence of griseofulvin in the developing keratin structures prevents the growth of fungi.



Griseofulvin

In vitro griseofulvin inhibits the growth of a wide variety of fungi. It is ineffective against some yeasts. *In vivo* it is effective against microsporon and trichophyton infections of the skin, scalp and nails including *M. canis*, *M. audouinii*, *M. gypseum*, *T. rubrum*, *T. mentagrophytes*, *T. verrucosum*, *T. tonsurans*, etc. It is not effective against *Candida albicans*.

is made by combining amphotericin B with a bile salt (desoxycholate), and full antifungal activity is retained. The bile salt derivative is prepared commercially for intravenous infusion. However, the material also may be dissolved in water and used as a mouth wash. It should not be swallowed for systemic treatment because this water soluble amphotericin is not absorbed in the gastrointestinal tract in sufficient quantities to give therapeutic blood levels.

Dose Initially, 0.25 mg/kg of body weight daily. Gradually increase to 0.75 mg/kg. If possible, the dose may be increased to 1.0 mg/kg. Infusions must be given slowly over a 6 hour period daily or every other day for 2 to 3 weeks or until toxic reactions necessitate temporary cessation of the drug.

To prepare the intravenous solution, 10 ml of 5% dextrose in water is added to the vial to make a solution containing 5 mg of amphotericin B/ml. Saline or glucose in saline cannot be used because a precipitate forms. The quantity needed to give a dose of 0.25 mg/kg of body weight is withdrawn and placed in a container with 200-500 ml of 5% dextrose in water. This solution is given over a 6 hour period. During the first several days of therapy it is common for chills and fever to occur during the infusion. This reaction often can be avoided by giving the patient 10 gr of aspirin when the infusion is begun and again in the middle of the infusion. If possible, infusions are given at least 5 days a week and the dose increased every other day until an amount equivalent to 0.75 mg/kg is reached. This is the usual maintenance dose. Patients often require repeated courses of therapy.

Side effects In addition to fever, there may be back pain in the renal area, rising nonprotein nitrogen levels, headache, nausea and vomiting.

Available in vials containing 50 mg of amphotericin B activity

Mycostatin Oral Tablets (Squibb)

50 mg tablets for treatment of dermatomycosis

Heavy Metal Antagonist

THE MOST EFFECTIVE DRUG for treating toxicity due to the heavy metals arsenic, gold, silver, mercury and bismuth is BAL (British anti lewisite). BAL also may be of use in decreasing the hyperpigmentation seen in heavy metal intoxication. This drug is contraindicated in cadmium poisoning.



BAL (British anti lewisite)
(2,3 Dithiopropanol)

Mode of action BAL combines through sulfhydryl linkages with a heavy metal, such as arsenic, and the BAL-arsenic complex is excreted in the urine. BAL is not used to combat cadmium intoxication because the BAL-cadmium complex formed is nephrotoxic.

Dose For intramuscular use only 0.025 ml of ampule solution per kg of body weight is given every 4 hours for 4 to 6 injections for the first 2 days. Thereafter, the dose is reduced to 2 injections daily for a total of 10 days or until recovery. The patient should be informed that BAL is very odorous. Side effects such as nausea and sweating may occur. If BAL inadvertently enters the blood stream, epinephrine or ephedrine should be given subcutaneously immediately to counteract an acute reaction consisting of constriction of the throat and chest, etc.

Available in ampules, each containing 4.5 ml of 10% solution of BAL in peanut oil with 20% benzyl benzoate (Hynson, Westcott & Dunning).

(candidiasis), *Malassezia furfur* (tinea versicolor) and *Blastomyces dermatitidis* (blastomycosis)

Dose *Trichophyton* infections 1 Gm daily in either a single or divided dose for 4 weeks After 4 weeks the dose may be reduced to 0.5 Gm daily for an additional 4 to 8 weeks

Microsporon infections in children Two possible schedules are

(1) 2 to 3 Gm in a single dose This dose may be repeated once 3 weeks later When possible the hairs should be clipped short 3 weeks after onset of therapy

(2) 250 mg daily for 4 weeks

Available in 250 mg tablets

Side effects Morbilliform or papular eruptions, gastrointestinal disturbances, headache, serum sickness, albuminuria and leukopenia have been reported

Iodides

KI
Potassium iodide

NaI
Sodium iodide

Indication Sporotrichosis

Dose Either potassium iodide or sodium iodide may be used The initial dose of potassium iodide is 10 drops of a saturated solution diluted in water or milk 3 times daily by mouth This is increased 5 drops with each of the 3 doses daily until the limit of tolerance is reached, usually 25–40 drops 3 times daily If sodium iodide is used 1 Gm in a 10% solution is given daily intravenously and continued for one month after clinical response is obtained

Side effects Lacrimation, metallic taste, gastrointestinal upset, iodide acne and other eruptions

Penicillin and Tetracycline Antibiotics

Indication Actinomycosis

Dose Penicillin—600 000 units intramuscularly daily for 10 days for a total of 6 million units

Tetracyclines—0.5 Gm orally 4 times daily for 25 days

Potassium iodide by mouth may be of value since it destroys granulomatous tissue and so gives the antibiotics access to the organisms within the lesions

an aromatic, acrid odor and a bitter taste. It is the stuff that knockout drops and Mickey Finns are made of.

Indication Chloral hydrate has little or no analgesic activity. But as a central nervous system depressant, it is used to produce sedation and hypnosis. It has a low incidence of skin reactions and is desirable when there is sensitivity to barbiturates.

Mechanism of action Chloral hydrate depresses the central nervous system so that ordinary doses cause sedation, usually without preliminary excitement, in 10-15 minutes and sleep within an hour. Sleep lasts for 5 hours and is usually not followed by after-effects although occasionally headache occurs. Chloral hydrate is oxidized to trichloroacetic acid in the liver and kidneys and is reduced to trichloroethanol by most tissues. The trichloroethanol formed combines with glucuronic acid, and the complex is excreted in the urine.

Contraindications and side effects This drug is contraindicated in patients with marked hepatic or renal disease. Cutaneous side effects include erythema, urticaria, hemorrhagic and eczematous lesions and exfoliative dermatitis.

Dose Adults

Sedation . . . 0.25 Gm 3 times daily

Sleep 0.5-1.0 Gm at bedtime

Children—Dose in grams for sleep

Newborn	6 mo	1 yr	2 yr	5 yr	10 yr
0.1	0.2	0.3	0.5	0.7	0.8

Available for oral use in 0.25 and 0.5 Gm capsules and in solution containing 0.5 or 0.65 Gm / tsp, available as rectal suppositories containing 0.65 or 1.3 Gm.

Paraldehyde



Paraldehyde

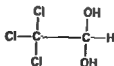
Hypnotics, Sedatives and Tranquilizers

UNTIL 1954 THE ONLY MEANS of allaying anxiety in tense but normal persons and of reducing hyperactivity in the abnormal patient was by administration of sedatives and hypnotics. These substances, in the form of barbiturates, chloral hydrate, paraldehyde and bromides, produce their effects of sedation and/or sleep by depressing cortical activity, as well as acting on the reticular formation, of the central nervous system. Whether a sedative or hypnotic action predominates is a function of the dose—small doses produce sedation and larger doses, sleep. Since then attempts have been made to find agents which will selectively influence subcortical areas of the brain in order to modify different aspects of the individual's reactions to his environment without producing cortical depression and sleep. Agents which have the psychopharmacologic effect of making a patient feel calm, relaxed or tranquilized are called tranquilizers or ataractics.

HYPNOTICS AND SEDATIVES

For most of the drugs described here, the night-time dose for treatment of insomnia is given. However, it is possible to use these drugs for daytime sedation by giving approximately one half the evening dose 2 or 3 times during the day.

Chloral Hydrate



Chloral hydrate

Chloral hydrate, the first of the artificial hypnotics to be used in medicine, was introduced about 85 years ago. It has

Indication Phenobarbital is given as a sedative for excitability

It must be used with caution because skin sensitivity occurs

Mechanism of action Phenobarbital depresses the central nervous system so that ordinary doses promote calmness within 1 to 2 hours. It is not an analgesic. Most barbiturates are rather uniformly distributed throughout all tissues. Somewhat higher concentrations are found in the liver and kidneys than in other organs, perhaps as a result of a greater degree of protein binding in these organs. The liver plays the most important role in metabolism of the barbiturates. Only barbitol is eliminated entirely in a chemically unchanged form. All others are excreted in part in altered form.

Dose Adults—32 mg orally every 4 to 6 hours

Children	Newborn	6 mo	1 yr	2 yr	5 yr	10 yr
mg	4	6	8	10	12	20

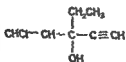
Available in tablets containing 16, 32 and 65 mg

Side effects and contraindications Skin reactions to phenobarbital include generalized morbilliform rash, bullous erythema multiforme, discrete coin sized violaceous macules of "fixed drug" type, urticaria and exfoliative dermatitis. Phenobarbital is tolerated poorly by patients with Addison's disease, diabetes mellitus or hyperthyroidism. It is contraindicated in the presence of poor hepatic or renal function. Addiction may occur.

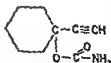
Tertiary Carbinols



Dormison



Placidyl
(Ethchlorvynol)



Valmid
(Ethnamate)

Indication These compounds are effective sedatives and hypnotics and can be used for the treatment of insomnia.

Mechanism of action Dormison is metabolized by the kidney,

Paraldehyde is a colorless liquid with a characteristic odor and disagreeable burning taste

Indication Paraldehyde is used as a hypnotic. Because of the odor it imparts to exhaled air, paraldehyde usually cannot be used for mild sedation in ambulatory patients

Mechanism of action The effects of paraldehyde on the central nervous system resemble those of alcohol. However, the action is much more prompt and powerful. Ordinary doses cause sleep without preliminary excitement in 10-15 minutes. Sleep persists for 4 to 8 hours. About 20% of the drug is excreted unchanged through the lungs, about 80% is metabolized to CO_2 and water, presumably by the liver.

Contraindications Paraldehyde should not be given in severe bronchopulmonary and hepatic disease because it is metabolized by the liver and excreted by the lungs.

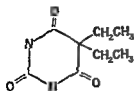
Dose Adults—4-8 ml orally

Children	Newborn	6 mo	1 yr	2 yr	5 yr	10 yr
ml	0.5	0.8	1.0	1.2	2.0	3.0

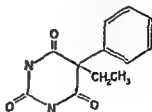
Available as full strength liquid paraldehyde

Barbital and Phenobarbital

The barbiturate group of depressant drugs has been used for sedation, hypnosis or anesthesia. Hundreds of derivatives of barbituric acid have been made and tried. Of the two included here, barbital was the first to be made and given a trial as a sedative. It is mentioned only so that its structure can be shown for comparative purposes. Phenobarbital is still one of the most commonly used derivatives of barbituric acid.



Barbital



Phenobarbital

TRANQUILIZERS

The development of these drugs, until recently, has been very slow. While agents were being evaluated for antihypertensive

acid diethylamide, an alkaloid of ergot which contains an indole nucleus as do the rauwolfia alkaloids, was found to produce hallucinations and other mental aberrations. In 1951 Thorazine, structurally related to the antihistamine Phenergan, was found to be useful in presurgical anesthesia. Later it was shown to affect human behavior. Then Miltown, related chemically to Tolserol, which had been used for several years to treat muscle spasm, was found to have sedative properties of an unusual type. All these events culminated in the development of a new and very active field—the search for compounds which influence different aspects of individual behavior. In dermatology these drugs are important for 2 reasons: (1) they are useful in controlling abnormal emotional states accompanying many dermatoses, (2) they are responsible for cutaneous drug eruptions.

Chemically it is possible to divide the tranquilizers into five groups of compounds: phenothiazine, rauwolfia alkaloid, substituted propanediol, diphenylmethane and metathiazanone.

Indication. Tranquilizers are used as an aid in the treatment of dermatoses that frequently are associated with increased nervous tension. These include atopic dermatitis, nummular eczema, lichen simplex, pruritus ani, neurotic excoriations, psoriasis, etc.

Mechanism of action. Tranquilizers affect both the central and peripheral components of the nervous system, but their dominant role is played in the subcortical areas of the brain. They control behavior through their effects on the reticular formation, diencephalon and limbic formation. The rauwolfia alkaloids and chlorpromazine act in all three of these regions, especially in the reticular formation. The result of their administration is sedation, decreased sensitivity to external stimuli.

liver and brain to CO_2 and water. The fate of the other two compounds is not known.

Dose Adults

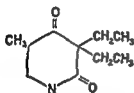
Placidyl—0.5 Gm at bedtime (available in 100, 200, 500 mg capsules)

Valmid—0.5 or 1.0 Gm at bedtime (available in 0.5 Gm tablets)

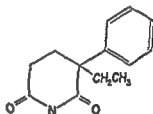
Dormison—0.5 Gm at bedtime (available in 250 and 500 mg capsules)

Side effects Dormison may cause acute exfoliative dermatitis

Piperidinediones



Noludar
(Methypylon)



Doriden
(Glutethimide)

Indication These compounds are used for the same purpose as the tertiary carbinols, i.e., for sedation and sleep.

Mechanism of action The depressant action of Noludar on the central nervous system resembles that of the intermediate to short acting barbiturates. Sleep ensues within 10–30 minutes and continues for 6 hours. The depressant action of Doriden is less than that of phenobarbital. Usually a hypnotic dose induces sleep within 30–60 minutes which continues for about 6 hours.

Dose Adults

Noludar—200–400 mg at bedtime (available in 50 and 200 mg tablets)

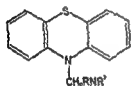
Doriden—0.5 Gm at bedtime (available in 0.25 and 0.5 Gm tablets)

turbing situations in human beings. A more basic mechanism of action is not known.

No experimental data are available on the mechanism of action of the methathiazanone compound, Trancopal.

Phenothiazine Derivatives

These drugs have the following basic structure



Thorazine	}	Tranquilizers
Verprin		
Compazine		
Sparine		
Temari		
Trilafon		
Dartal		
Pacatal		

Phenergan	}	Antihistamines
Theruhistin		
Pyrolazote		

All these drugs are potential photosensitizers. Along with the chemical structures of the tranquilizers, formulas for some antihistamines are given to show their similarity. In addition, the phenothiazine and diphenylmethane tranquilizers and the antihistamines have the following core in common: $-\text{CH}_2\text{CH}_2\text{N}-$. In some cases this core is changed slightly, but usually it is left intact. For this reason all these drugs tend to overlap in the physiologic properties of being tranquilizers, antihistamines, antiemetics and anti motion sickness agents. The Theruhistin nucleus is similar to but not identical with the phenothiazine nucleus. For simplicity, the salts of these substances that are available commercially are not illustrated. The molecular weight of the salt—whether it is a hydrochloride, tartrate etc.—determines in part the over-all tablet size and dose.

and depression of sympathetic activity and skeletal muscle tone

Reserpine activates release of the neurohormone serotonin in the brain and, in a direct peripheral action, depletes the peripheral nerve endings of nor epinephrine. The onset of action of reserpine is slower than that of chlorpromazine, the peak effect occurring several hours after administration. Reserpine is in the body for only a few hours but the impairment of serotonin storage mechanisms persists for a long time.

Chlorpromazine does not affect serotonin. It may interfere with the action of nor epinephrine. Chlorpromazine can block the peripheral action of epinephrine, but this is not its chief function. In addition it has antihistamine activity and is a potent local anesthetic. Unlike reserpine the effects of chlorpromazine are prompt and reach a peak within one hour. Nearly all chlorpromazine taken by mouth is metabolized. Little is excreted in the urine as such. About 15% of chlorpromazine given intravenously is excreted in the urine as the sulfoxide. The latter has many of the pharmacologic properties of the free compound but is much less active.

Less is known of the mechanism of action of the substituted propanediols and diphenylmethane drugs. The former, of which Miltown and Equanil are well known examples, cause changes in spontaneous electrical activity of the cortex and thalamus and depress polysynaptic reflexes in the spinal cord. In the usual clinical doses there are no effects outside the central nervous system. Their action begins soon after administration and lasts for a few hours. Ten per cent of meprobamate is excreted unchanged in the urine. Another fraction is conjugated before excretion and the remainder is metabolized to unknown products. Tolseram but not Tolserol can reduce the pituitary output of MSH (melanocyte stimulating hormone) to normal in patients with alopecia areata. Such patients ordinarily excrete excessive amounts of MSH in the urine.

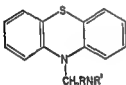
The diphenylmethane compounds have some antiacetylcholine like activity on tissues outside the central nervous system. They reduce autonomic responses to emotionally dis-

turbing situations in human beings. A more basic mechanism of action is not known.

No experimental data are available on the mechanism of action of the metathiazanone compound, Trancopal.

Phenothiazine Derivatives

These drugs have the following basic structure

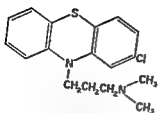


Thorazine Vesprin Compazine Sparine Temaril Trilafon Dartal Pacatal	}	Tranquilizers
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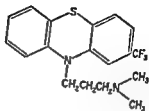
Phenergan Theruhistin Pyrrolazote	}	Antihistamines
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All these drugs are potential photosensitizers. Along with the chemical structures of the tranquilizers formulas for some antihistamines are given to show their similarity. In addition, the phenothiazine and diphenylmethane tranquilizers and the antihistamines have the following core in common $-\text{CH}_2\text{CH}_2\text{N}-$. In some cases this core is changed slightly, but usually it is left intact. For this reason all these drugs tend to overlap in the physiologic properties of being tranquilizers, antihistamines, antiemetics and anti motion sickness agents. The Theruhistin nucleus is similar to but not identical with the phenothiazine nucleus. For simplicity, the salts of these substances that are available commercially are not illustrated. The molecular weight of the salt—whether it is a hydrochloride, tartrate, etc.—determines in part the over all tablet size and dose.

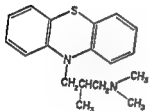
PHENOTHIAZINE



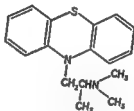
Thorazine
(Chlorpromazine)



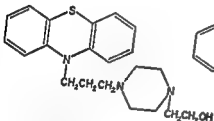
Verspril
(Trifluorpromazine)



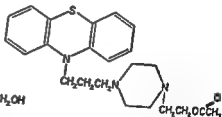
Temaril
(Trimeprazine)



Phenergan
(Promethazine)

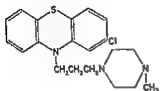


Trilafon
(Perphenazine)

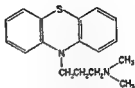


Dartal
(Thiopropazate)

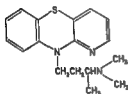
COMPOUNDS



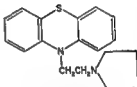
Compazine
(Prochlorperazine)



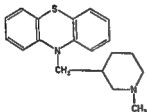
Sparine
(Promazine)



Theruhistm
(Isothipendyl)

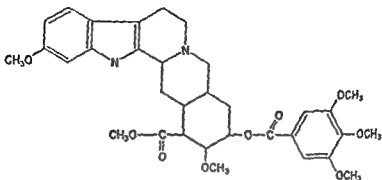


Pyrrolazote
(Pyrathiazine)

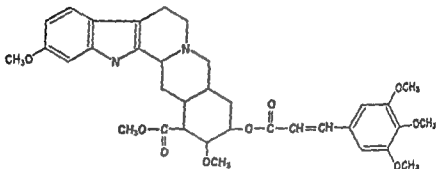


Pacatal
(Mepazine)

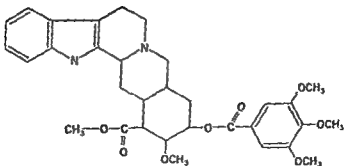
Rauwolfia Alkaloids



Reserpine
(Reserpoid, Rau Sed, Serpasil)



Rescinnamine
(Modenil)

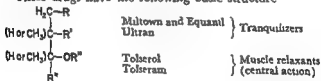


Deserpidine
(Harmony)

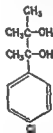
Alkaloids are organic basic substances found in plants. The rauwolfia alkaloids, of which *Rauwolfia serpentina* Benth is the best known species, are woody plants which grow in tropical areas. The 3 pure rauwolfia alkaloids used in medicine today are reserpine, rescinnamine and deserpidine. These compounds are used for their hypotensive effects in hypertension and their tranquilizing effects in emotional disorders. The rauwolfia alkaloids and lysergic acid derivatives have an indole nucleus which makes them similar in structure to serotonin and melatonin.

Substituted Propanediol Compounds

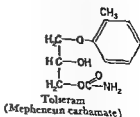
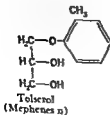
These drugs have the following basic structure



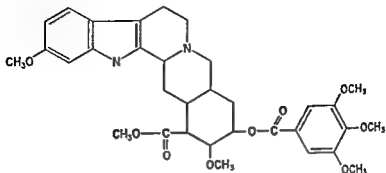
Miltown Equanil
(Meprobamate)



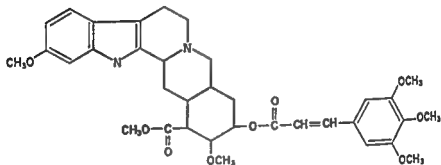
Ultran
(Phenaglycodol)



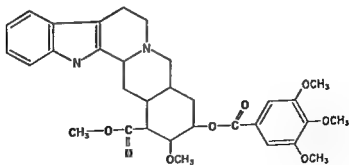
Rauwolfia Alkaloids



Reserpine
(Reserpoid, Rau Sed, Serpasil)



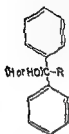
Rescinnamine
(Modenl)



Deserpine
(Harmony)

Diphenylmethane Compounds

These drugs have the following basic structure

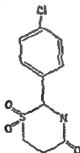


Soavital Frenquel Atarax, Vistanl	} Tranquilizers
Benadryl Ambodryl Dimetane*	
Diafen Perazul	} Some representative antihistamines
Dramamine Bonamine	
	} For prevention and treatment of motion sickness

For comparison the structural formulas of 10 diphenylmethane drugs are given. It will be noted that 3 are tranquilizers, 5 are antihistamines and 2 are used for the prevention and treatment of motion sickness.

Metathiazanone

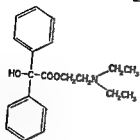
The only compound of this type available at present is Trancopal (Winthrop).



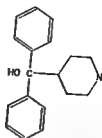
Trancopal

*The chemical nucleus of Dimetane is similar to but not identical with the diphenylmethane nucleus.

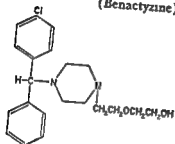
DIPHENYLMETHANE COMPOUNDS



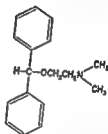
Suavitil
(Benactyzine)



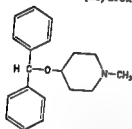
Frenquel
(Azacyclonol)



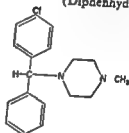
Atarax, Vistaril
(Hydroxyzine)



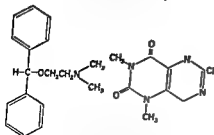
Benadryl
(Diphenhydramine)



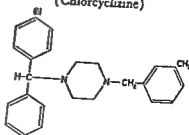
Diafen
(Diphenylpyraline)



Perazil
(Chlorcyclizine)



Dramamine
(Dimenhydrinate)



Bonamine
(Meclizine)

compound of this type Tolseram but not Tolserol can cause light bands of decreased pigmentation of the scalp hair in brown haired persons

Diphenylmethane compounds Erythematous papular eruptions may occur from direct contact with the drug or following systemic administration Drowsiness and dizziness occur

Metathiazanone Dermatitis, flushing, dizziness, nausea and weakness may occur

DOSE OF TRANQUILIZERS

These compounds are prepared in different strengths and in various forms such as tablets, capsules, solutions, suppositories and sustained release preparations The usual oral doses of some common tablet forms are given below

	ADULTS 3-4 Times Daily	CHILDREN 3-4 Times Daily
<i>Phenothiazine compounds</i>		
Thorazine		
10, 25, 50, 100 mg	25 mg	0.25 mg /lb body wt
Vesprin		
10 mg	10 mg	
Compazine		
5, 10 mg	5 mg	5 mg
Sparine		
10, 25, 50, 100, 200 mg	10-25 mg	
Temaril		
2.5 mg	2.5 mg	
Trilafon		
2, 4, 8, 16 mg	2-4 mg	
Dartal		
5, 10 mg	5 mg	
*Pacatal		
25, 50, 100 mg	25 mg	
Wbenergan		
12.5, 25 mg	12.5-25 mg	
<i>Rauwolfia alkaloids</i>		
Reserpine		
Reserpid 0.1, 0.25, 1, 0.4 mg	0.1 mg	
Rau Sed 0.1, 0.25, 0.5, 1.0 mg	0.1 mg	
Harmonyl		
0.1, 0.25, 1 mg	0.1 mg q d	
Modenil		
0.25, 0.5 mg	0.25 mg q d	

*Quies for psychoses

SIDE EFFECTS AND TOXIC REACTIONS
OF TRANQUILIZERS

Phenothiazine compounds These compounds are photosensitizers, and often a pronounced long-lasting erythema is observed. They should not be given to any patient receiving ultraviolet light therapeutically, as in psoriasis or atopic dermatitis, because of the possibility of inducing photosensitizing reactions. Dermatitis may occur with or without exposure to ultraviolet light. Erythema and papules may result from direct contact with the drug and through oral or parenteral administration. Purpura, urticaria and erythema multiforme like eruptions may occur. Systemic side reactions include an exaggeration of therapeutic effects, such as drowsiness and lethargy. Jaundice, parkinsonian-like neurologic findings, orthostatic hypotension and blood dyscrasias may occur. These drugs should be withheld in liver disease.

If a patient is sensitive to a particular phenothiazine compound, e.g., Thorazine or Phenergan, but requires further therapy, it is advisable to check structural formulas in order to select a drug to which cross sensitization might not be expected to occur.

Rauwolfia alkaloids Purpura and ecchymoses may occur. Exaggerated therapeutic effects such as lethargy, fatigue and muscle weakness may develop. Other systemic effects include confusion, paranoia, depression leading to suicide, nightmares and anxiety, bradycardia and hypotension, increased motor and secretory activity of the gastrointestinal tract leading to increased food intake and weight gain, gastritis, diarrhea, hemorrhage, nasal stuffiness and epistaxis. *Rauwolfia alkaloids* should not be given to depressed patients.

Substituted propanediols Cutaneous reactions to meprobarbital therapy include purpuric, eczematous, erythematous and papular skin eruptions. Systemic reactions include weakness, severe sedation with inability to stand or walk, nausea and vomiting. Sudden withdrawal of the drug may be followed by anorexia, vomiting, anxiety, insomnia, tremors, muscle twitching, hallucinations or grand mal seizures. A 'let down' feeling often occurs soon after initiating therapy with any

compound of this type Tolseram but not Tolserol can cause light bands of decreased pigmentation of the scalp hair in brown haired persons.

Diphenylmethane compounds Erythematous papular eruptions may occur from direct contact with the drug or following systemic administration. Drowsiness and dizziness occur

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10 mg	10 mg	
Compazine		
5, 10 mg	5 mg	5 mg
Sparine		
10, 25, 50, 100, 200 mg	10-25 mg	
Temaril		
25 mg	25 mg	
Trilafon		
2, 4, 8, 16 mg	2-4 mg	
Daral		
5, 10 mg	5 mg	
*Pacatal		
50, 100 mg	25 mg	
Phenergan		
12.5, 25 mg	12.5-25 mg	
<i>Rauwolfia alkaloids</i>		
Reserpine		
Reserpid 0.1, 0.25, 1.0, 4 mg	0.1 mg	
Rau Sed 0.1, 0.25, 0.5, 1.0 mg	0.1 mg	
Harmonyl		
0.1, 0.25, 1 mg	0.1 mg q.d.	
Moderil		
0.25, 0.5 mg	0.25 mg q d	

*Chiefly for psychoses.

SIDE EFFECTS AND TOXIC REACTIONS OF TRANQUILIZERS

Phenothiazine compounds These compounds are photosensitizers, and often a pronounced long lasting erythema is observed. They should not be given to any patient receiving ultraviolet light therapeutically, as in psoriasis or atopic dermatitis, because of the possibility of inducing photosensitizing reactions. Dermatitis may occur with or without exposure to ultraviolet light. Erythema and papules may result from direct contact with the drug and through oral or parenteral administration. Purpura, urticaria and erythema multiforme like eruptions may occur. Systemic side reactions include an exaggeration of therapeutic effects, such as drowsiness and lethargy. Jaundice, parkinsonian-like neurologic findings, orthostatic hypotension and blood dyscrasias may occur. These drugs should be withheld in liver disease.

If a patient is sensitive to a particular phenothiazine compound, e.g., Thorazine or Phenergan, but requires further therapy, it is advisable to check structural formulas in order to select a drug to which cross sensitization might not be expected to occur.

Rauwolfia alkaloids Purpura and ecchymoses may occur. Exaggerated therapeutic effects such as lethargy, fatigue and muscle weakness may develop. Other systemic effects include confusion, paranoia, depression leading to suicide, nightmares and anxiety, bradycardia and hypotension, increased motor and secretory activity of the gastrointestinal tract leading to increased food intake and weight gain, gastritis, diarrhea, hemorrhage, nasal stuffiness and epistaxis. Rauwolfia alkaloids should not be given to depressed patients.

Substituted propanediols Cutaneous reactions to meprobamate therapy include purpuric, eczematous, erythematous and papular skin eruptions. Systemic reactions include weakness, severe sedation with inability to stand or walk, nausea and vomiting. Sudden withdrawal of the drug may be followed by anorexia, vomiting, anxiety, insomnia, tremors, muscle twitching, hallucinations or grand mal seizures. A "let down" feeling often occurs soon after initiating therapy with any

compound of this type Tolseram but not Tolserol can cause light bands of decreased pigmentation of the scalp hair in brown haired persons

Diphenylmethane compounds Erythematous papular eruptions may occur from direct contact with the drug or following systemic administration. Drowsiness and dizziness occur

Metathiazanone Dermatitis, flushing, dizziness, nausea and weakness may occur

DOSE OF TRANQUILIZERS

These compounds are prepared in different strengths and in various forms such as tablets, capsules, solutions, suppositories and sustained release preparations. The usual oral doses of some common tablet forms are given below

	ADULTS 3-4 Times Daily	CHILDREN 3-4 Times Daily
<i>Phenothiazine compounds</i>		
Thorazine 10, 25, 50, 100 mg	25 mg	0.25 mg /lb body wt
Vesprin 10 mg	10 mg	
Compazine 5, 10 mg	5 mg	5 mg
Sparine 10, 25, 50, 100, 200 mg	10-25 mg	
Temarl 2.5 mg	2.5 mg	
Trilafon 2, 4, 8, 16 mg	2-4 mg	
Dartal 5, 10 mg	5 mg	
*Pacatal 25, 50, 100 mg	25 mg	
Phenergan 12.5, 25 mg	12.5-25 mg	
<i>Rauwolfia alkaloids</i>		
Reserpine Reserpidol 0.1, 0.25, 1 0.4 mg	0.1 mg	
Rau Sed 0.1, 0.25, 0.5, 1 0 mg	0.1 mg	
Harmonyl 0.1, 0.25, 1 mg	0.1 mg q d	
Moderyl 0.25, 0.5 mg	0.25 mg q d	

*Chiefly for psychoses

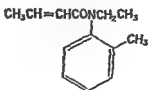
	Adults 3-4 Times Daily	Children 3-4 Times Daily
<i>Diphenylmethane derivatives</i>		
Suavitil		
1 mg	1 mg	
Frenquel		
20, 100 mg	100 mg t.i.d initially, 20 mg q.d maintenance	
Atarax		
10, 25, 100 mg	25 mg	3-6 yr 10 mg 8 yr 20 mg
Benadryl		
25, 50 mg capsules	50 mg	10-20 mg
<i>Substituted propanediols</i>		
Miltown and Equanil		
200, 400 mg	400 mg	3 yr 100 mg
Ultran		
300 mg capsules	300 mg	
Tolserol		
0.25, 0.5 Gm	1 Gm	
Tolseram		
0.5 Gm	1 Gm	
<i>Metathiazanone</i>		
Trancopal		
100 mg	100 mg	

Insecticides and Insect Repellents

INSECTICIDES AND INSECT REPELLENTS differ from one another. Whereas an insecticide is lethal to an insect it may be incapable of repelling the insect or preventing its bite. On the other hand an agent may be a repellent without having insecticidal activity. Some agents exert both actions.

Eurax (Geigy)

Eurax contains 10% N ethyl o crotonotoluide



N Ethyl-o crotonotoluide

Indication For the prevention and treatment of scabies. Also may be used as a nonspecific antipruritic, its mode of action in this regard being unknown.

Mode of action Scabicide

Application Before bedtime, the cream or lotion should be massaged into the skin of the entire body from the chin down, paying particular attention to the interdigital spaces, flexor surfaces of the wrists, inner and outer aspects of the elbows, axillae, undersurface of the breasts, the umbilicus, buttocks and inner aspects of the thighs. This procedure may be repeated the next morning. A complete bath may be made the morning after the last application, and the previously used garments and linen should be laundered or dry cleaned. To avoid relapse, all members of an infected household should be thoroughly examined, and all contacts should receive prophylactic treatment.

Contraindication Do not apply Eurax to acutely inflamed skin or to raw, weeping areas.

Available as a 10% cream in 20 and 60 Gm tubes and as a 10% lotion in 2 and 6 oz bottles.

Kwell (Reed & Carnrick)

Kwell contains 1% lindane, the gamma isomer of 1,2,3,4,5,6-hexachlorocyclohexane.



Lindane
(1,2,3,4,5,6 hexachlorocyclohexane)

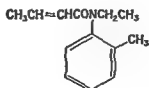
	ADULTS 3-4 Times Daily	CHILDREN 3-4 Times Daily
<i>Diphenylmethane derivatives</i>		
Suavitil		
1 mg	1 mg	
Frenquel		
20, 100 mg	100 mg t i d initially, 20 mg q d maintenance	
Atarax		
10, 25, 100 mg	25 mg	3-6 yr 10 mg 7 yr 20 mg
Benadryl		
25, 50 mg capsules	50 mg	10-20 mg
<i>Substituted propanediols</i>		
Miltown and Equanil		
200, 400 mg	400 mg	3 yr 100 mg
Ultram		
300 mg capsules	300 mg	
Tolserol		
0.25, 0.5 Gm	1 Gm	
Tolseram		
0.5 Gm	1 Gm	
<i>Metathiazanone</i>		
Trancopal		
100 mg	100 mg	

Insecticides and Insect Repellents

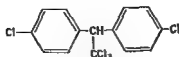
INSECTICIDES AND INSECT REPELLENTS differ from one another. Whereas an insecticide is lethal to an insect, it may be incapable of repelling the insect or preventing its bite. On the other hand, an agent may be a repellent without having insecticidal activity. Some agents exert both actions.

Eurax (Geigy)

Eurax contains 10% N-ethyl o-crotonotoluide



N-Ethyl-o-crotonotoluide

DDT

DDT
(Dichlorodiphenyl trichloroethane)

Indication For prevention and treatment of pediculosis

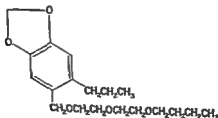
Mode of action DDT kills mature lice and larvae but not nits. However, it remains on the skin and clothing long enough for ova to develop and be destroyed at that time. If DDT does not kill all the lice, add 0.2% pyrethrins or use lindane and pyrethrin powder.

Application Dust into clothing and onto skin.

Available as 2% DDT emulsion or 10% DDT in talcum powder.

Emulsifiable Pyrenone 10-1 (Fairfield Chemicals)

This repellent contains 10% piperonyl butoxide and 1% pyrethrin. Piperonyl butoxide is a technical product containing 80% pure (3,4-methylene-di-*ortho*-6-propyl benzyl) (butyl)-diethylene glycol ether.



Piperonyl butoxide

Indication For prevention and treatment of scabies, pediculosis and chigger infestations and to repel ticks and other arthropods

Mode of action Scabicide and pediculicide

Application See Eurax

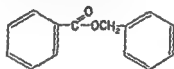
Available as a cream in 60 Gm jars and as a lotion in 2 oz bottles.

Topocide (Lilly)

Topocide is an aqueous emulsion of benzyl benzoate

Benzyl benzoate	12.5%
Benzocaine	2%
DDT	1%

Water, bentonite magma and polyoxyalkylene sorbitan mono-oleate comprise the inert ingredients



Benzyl benzoate

Indication For treatment of pediculosis (*Pediculus capitis* and *Phthirus pubis*) and scabies

Mode of action Scabicide and pediculicide

Application (1) Scabies Following a soapy bath, rub Topocide into dry skin with gauze sponges. Allow to dry. After each washing apply lotion to hands only. Do not bathe for at least 24 hours. Treat clothing as described under Eurax.

(2) Head lice Wash hair with regular shampoo. When hair is dry, anoint scalp and comb hair to spread medication. Leave on for 10 days. Repeat in 2 or 3 weeks if necessary.

(3) Pubic lice Apply to affected parts, leave Topocide on for 2 days and then wash off.

Caution Protect eyes from medication. Do not reapply, except to hands for 10-15 days.

Available in 4 oz bottles.

Indication, mode of action, application See Emulsifiable Pyrenone 10-1

Available as Triple max Repellent Liquid in 2 oz bottles or Creme in 1 or 2 oz tubes, the latter containing 94% of the liquid with 6% carnauba wax

Skat (J W Williams)

Rutgers 612 (2 ethyl 1,3 hexanediol)	70%
Alcohol	30%

Indication, mode of action, application See Emulsifiable Pyrenone 10-1

Available in 50 Gm. bottles

6-12 Insect Repellent (Union Carbide)

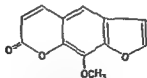
This compound is 100% Rutgers 612 (2-ethyl 1,3 hexanediol)

Indication, mode of action, application See Emulsifiable Pyrenone 10-1

Light Protective Agents

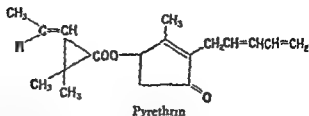
ORAL

Methoxsalen (Oxsoralen, Elder, Meloxine, Upjohn)



8 Methoxypsoralen
(8 MOP, methoxsalen, Oxsoralen, Meloxine)

8 Methoxypsoralen has the unusual property of increasing the biologic effects of light in the region of 3,600 Å. When



In pyrethrin I, R is CH_3

In pyrethrin II, R is COOCH_3

Indication For use as a repellent against mosquitoes, flies, chiggers, ticks, fleas, etc. Confers protection for 2 to 6 hours after application

Mode of action Insecticidal

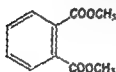
Application For use as a tactile repellent, apply to skin before exposure to insects. Repeat every 2 to 6 hours depending upon degree of perspiration. The chemical may be applied to clothing in a spray after it is diluted 1:9 with water.

Available in 2 oz. bottles

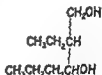
Insect Repellent 622 (Fairfield Chemicals)

This preparation, also known as Triple max Repellent Liquid, contains the following substances:

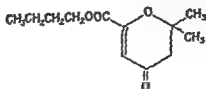
6 parts dimethylphthalate
2 parts indalone
2 parts Rutgers 612



Dimethylphthalate



Rutgers 612
(2 Ethyl 1,3 hexanediol)



Indalone
(Butopyronoxyl)

intensity comes out of the solution in the line of the incident beam, and light of a longer wavelength (fluorescence) is produced in the solution and comes out at all angles to the incident beam. These two optical properties, absorption and fluorescence, are most readily compared by plotting the absorption curves and the fluorescence curves.

However, the optimum wavelength to produce fluorescence for all three compounds is 3,600 Å. The fluorescent light emerging from the solutions is most intense from 4,200 to 4,600 Å. The optimum wavelength for biologic activity appears to be related not to the light absorption maximum or fluorescence maximum but to the optimum wavelength—3,600 Å—to produce fluorescence. At 3,600 Å psoralen is 2.3 times more activated than 8-methoxypsoralen, and trimethylpsoralen is 15 times more activated.

prescribed limits during the first 3 to 4 days in order to acquire skin changes that will afford protection against subsequent exposure. If the patient takes 20 mg of 8-methoxypsoralen and on the first day exposes himself to intense sunlight for one or more hours rather than for the recommended time, he will develop marked erythema, edema and blistering of the skin. A sun exposure guide suggested by Fitzpatrick is as follows:

EXPOSURE IN MINUTES

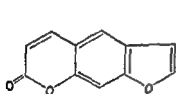
BASE SKIN COLOR	Initial	2d	3d	4th	Subsequent Exposures
Light	15	20	25	30	Gradually increase, based on erythema and tenderness
Medium	20	25	30	35	

Side effects Side effects are uncommon. Most frequently encountered are nausea, increased nervous tension and insomnia. The view that 8-methoxypsoralen causes liver damage has not been substantiated.

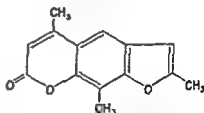
Contraindications 8-Methoxypsoralen should not be given to patients who have illnesses associated with light hyper-

approximately 20 mg of this substance is taken orally, increased tanning and decreased burning occur following exposure of the skin to sunlight. When 50 mg or more is taken all the reactions of skin to light are increased. These include pigmentation, erythema, thickening of the keratin layer, etc. Within a few days after ingesting 8-methoxypsoralen and exposing the skin to sunlight, the tanning and keratin formation responses become pronounced, with a subsequent decrease in the erythematous reaction. In this way 8-methoxypsoralen can prevent burning of skin from ultraviolet light and increase the tanning response. The drug has no effect when given without subsequent exposure of the skin to light. When 8-methoxypsoralen is added to cultures of some bacteria and fungi and the latter are exposed to ultraviolet light, inhibition of growth occurs.

Psoralen derivatives occur naturally in a variety of plants throughout the world, and new ones can be made synthetically. These natural and synthetic psoralens vary in their capacity to augment tanning and erythema. When applied topically the basic nucleus, psoralen, is the most potent producer of erythema following exposure of skin to sunlight. Trimethylpsoralen is the second most potent psoralen. Both of these substances are more active than 8-methoxypsoralen. However, only 8-methoxypsoralen has been thoroughly studied in vivo in man. The trimethylpsoralen looks promising because it is not only more potent than 8-methoxypsoralen when applied topically but is also without apparent toxicity in animals.



Psoralen



4,5,8 Trimethylpsoralen (TM)

When light of a given wavelength passes through a solution containing a psoralen compound, two things happen. Light of the same wavelength and of either the same or of reduced



Para aminobenzoic acid



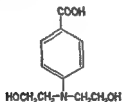
Titanium dioxide

Mode of action PABA absorbs ultraviolet light in the region of 2,500–3,100 Å. Titanium dioxide is an opaque substance which absorbs throughout the entire light spectrum.

Available on prescription

Skolex (Williams)

P-dihydroxyethyl aminobenzoic acid 5%
In water washable base



P-dihydroxyethyl aminobenzoic acid

Mode of action See PABA

Available in 2 oz. bottles

Skol (Williams)

P-dihydroxyethyl aminobenzoic acid 5%
In a lotion

Available in 8 oz. bottles

sensitivity, such as lupus erythematosus or polymorphous light eruptions

Carotene

Indication Oral administration of carotene may be useful in patients in whom exposure to light of the visible spectrum results in urticaria

Mode of action Carotene deposited in the skin after oral administration absorbs visible light to reduce the action of the light on the skin

Dose 50 000 units (based on vitamin A activity) daily

Available in capsules containing 25 000 units of vitamin A activity

Chloroquine and Plaquenil

These drugs are discussed in the next section, Lupus Erythematosus and Light Sensitivity Eruptions. Since these drugs are so helpful in patients with polymorphous light eruptions they should be tried in patients who have other types of light sensitivity diseases

TOPICAL

Topical preparations to protect against sunlight contain agents that either are opaque to light—such as titanium dioxide—or compounds that absorb light in certain regions of the spectrum—such as para and ortho aminobenzoic acid derivatives, tannic acid derivatives, etc. Light protective ointments are applied to areas likely to be exposed to sunlight. They are effective for periods up to 4 hours depending on the amount of perspiration. These preparations are used in disorders aggravated by ultraviolet radiation e.g., lupus erythematosus and when melanin pigmentation is undesirable, as in melasma of pregnancy.

PABA Ointment

Para aminobenzoic acid	10%
Titanium dioxide	5%
In water washable base	

A-Fil Sun Stick (Texas Pharmacal)

Digalloyl trioleate
In a wax stick

2.5%

This stick can be applied to the lips for protection against ultraviolet light.

Lupus Erythematosus and Light Sensitivity Eruptions

ANTIMALARIALS

ARALEN, PLAQUENIL, ATABRINE AND CAMOQUIN are useful in the therapy of lupus erythematosus (systemic and discoid) and for the prevention of some light sensitivity eruptions.

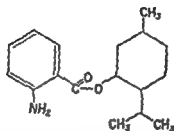
When the lesions of lupus erythematosus are confined primarily to the skin, the patient can be treated with the antimalarial drugs alone. When the disease is chiefly systemic, steroids alone may be used. However, for most patients with systemic involvement, it is best to use a combination of steroids and antimalarials in order to keep the dose of steroids as low as possible and to obtain a greater therapeutic effect.

When a single antimalarial is used, the drug of choice is either Aralen or Plaquenil. At times the patient will respond to one better than to the other. Atabrine is not used alone, because to obtain a satisfactory therapeutic effect, sufficient Atabrine must be given to make the skin yellow. Also, Atabrine is perhaps the most toxic of the 4 drugs. Agranulocytosis has resulted from Atabrine and Camoquin but not from Aralen and Plaquenil. One preparation is available (Triquin) which contains 3 of the antimalarials.

Mechanism of action. The antimalarials have some properties similar to those of riboflavin. In rats, Atabrine increases the excretion of riboflavin and promotes the growth of young animals given suboptimal amounts of riboflavin. Aralen, Plaquenil and Atabrine have structures that are similar not only to riboflavin but also to Apresoline. Apresoline can

A-Fil (Texas Pharmacal)

Menthyl anthranilate 5%
 Titanium dioxide 5%
 In a water-washable base

**Menthyl anthranilate**

The active part of menthyl anthranilate is the ortho-amino-benzoic acid nucleus. The light absorption of this compound is similar to that of para-aminobenzoic acid.
Available in 2 oz tubes

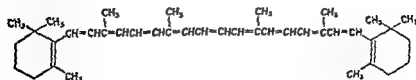
Neo-A-Fil (Texas Pharmacal)

Digalloyl trolate 3%
 In a water washable base

Digalloyl trolate consists of a mixture of 3 derivatives of tannic acid and absorbs ultraviolet light in the region of 2,900 through 3,150 Å.
Available in 2 oz tubes

Carotene Ointment

Carotene absorbs light in the region of 4,000-5,000 Å. An ointment containing this compound can be made by adding 50,000 units of beta-carotene to each gram of water-washable base.

**Beta-carotene**

A-Fil Sun Stick (Texas Pharmacal)

Digalloyl trioleate
In a wax stick

25%

This stick can be applied to the lips for protection against ultraviolet light.

Lupus Erythematosus and Light Sensitivity Eruptions

ANTIMALARIALS

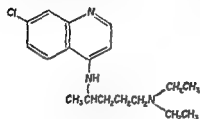
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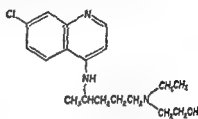
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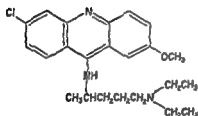
produce lupus erythematosus in man, whereas the antimalarials are used to treat this disease. Thus one gets the impression that lupus erythematosus is a metabolic disorder involving the metabolism of the flavinoids related to riboflavin and that the antimalarials can correct this biochemical defect.



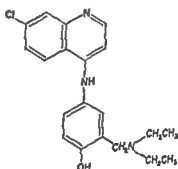
Aralen
(Chloroquine)



Plaquenil
(Hydroxychloroquine)



Atabrine
(Quinacrine)



Carmoquin
(Amodiaquin)

Dose

Aralen phosphate (Winthrop)—250 mg 2–3 times daily for 2–4 weeks. After a good response, the dose is reduced gradually to 250 mg daily.

Available in 250 mg tablets.

Plaquenil sulfate (Winthrop)—The required dose of Plaquenil usually is greater than that of Aralen. The initial dose may be 200 mg 3 times daily with gradual reduction to 200 or 400 mg daily.

Available in 200 mg tablets.

Atabrine hydrochloride (Winthrop)—100 mg 3 times daily until improvement or until the skin becomes yellow, followed by 100 mg as the daily maintenance dose. The white count should be checked weekly.

Available in 100 mg tablets.

Triquin (Winthrop)—This drug is a mixture of Aralen phosphate 65 mg, Plaquenil sulfate 50 mg and Atabrine hydrochloride 25 mg. One tablet 3 to 4 times daily until a good response is obtained, after which the dose may be reduced slowly to 1 tablet daily.

Camoquin (Parke Davis)—200 mg 3 times daily after meals for 2 weeks. The dose is then reduced to 200 mg 2 times daily. The white count should be checked weekly.

Available in 200 mg tablets.

Side effects

Chloroquine frequently causes the formation of opacities in the corneal epithelium, resulting in blurred vision and halos around light. These changes have been reversed by either decreasing the dose or discontinuing the drug. Urticaria and exfoliative dermatitis have occurred. Spectacular changes in hair color may take place. Blond, red and brown hair may grow out in a light blond shade. This effect is reversible. Leukopenia may occur.

Caution. Chloroquine should not be given to patients with psoriasis because it may aggravate this disease.

Plaquenil is almost identical in chemical structure to chloroquine, so that similar side effects may occur.

Atabrine has been associated with skin eruptions and agranulocytosis.

Camoquin sometimes causes vertigo. One patient developed jaundice, lethargy, anorexia and partial blindness. These symptoms cleared on cessation of the drug. Agranulocytosis has occurred.

All the antimalarials can produce gastrointestinal reactions such as nausea and vomiting.

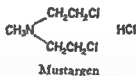
STEROIDS

Oral steroid preparations are given to patients with acute lupus erythematosus (see section on Steroids and ACTH). After the disease is satisfactorily controlled, the steroid dose is reduced slowly to the minimum required to maintain the patient free from symptoms. At this stage the antimalarials may be added and an additional attempt made to lower the steroid dose even further.

Topically, 1% hydrocortisone or 0.5% prednisolone preparations have little or no effect on the cutaneous lesions of lupus erythematosus. However, 0.25% fluorohydrocortisone, 2.5% hydrocortisone and 0.1–0.5% triamcinolone acetonide are effective and should be used in conjunction with chloroquine derivatives.

Nitrogen Mustard Therapy

Mustargen (Merck, Sharp & Dohme)



(2,2-Dichloro-N-methyldiethylamine hydrochloride methyl bis (β-chloroethyl)amine hydrochloride HN₂ hydrochloride)

Indication Mycosis fungoides tumor stage. Has been used in some selected cases of systemic lupus erythematosus.

Mode of action Depresses lymphoid tissue.

Dose 0.1 mg/kg of body weight each day, or every other day for 4 doses; the total amount for a single injection not to exceed 8 mg. The solution should be freshly prepared each time, and the calculated volume should be injected into

the tubing of a running intravenous infusion 50 mg of Benadryl may be given intravenously at the same time to help allay nausea

Mustargen has been used in treatment of some cases of systemic lupus erythematosus which have not responded to other forms of therapy Great caution must be exercised in giving nitrogen mustard to these patients because they often have severe leukopenia to begin with

Available in sets of four 20 ml vials, each containing 10 mg of drug in dry form triturated with 90 mg of anhydrous sodium chloride

Side effects Nausea, vomiting, agranulocytosis The white blood cell count should be followed closely because of the possibility of agranulocytosis developing This may appear approximately one week after the course of treatment It may be advisable to protect the patient with combinations of antibiotics until the period of agranulocytosis is past, usually about 3 weeks after the end of therapy

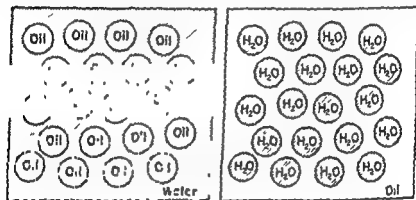
Caution Mustargen should not be allowed to come in contact with skin or mucous membranes, for vesication may occur It should not be given to pregnant women because, although results of treatment during pregnancy in human beings are not known, malformations of the fetus have occurred in rats

Ointment Bases and Lubricating Agents

BECAUSE OF THEIR physical properties, ointments are used in dermatologic therapy for 3 purposes (1) as lubricating agents, (2) as vehicles in which to incorporate drugs required to treat skin disorders, and (3) as protective coverings not only to prevent contact of the skin surface with noxious agents but to reduce heat loss

Ointments are commonly classified into 3 types oil in water

(O/W), water-in-oil (W/O) and inert oil. The last named includes petrolatum, mineral oil and Carbowax. The O/W and W/O ointments are emulsions. The relative amounts of water and oil and the nature of the emulsifying agent determine the type of emulsion. The term *oil-in-water* indicates that oil droplets, the discontinuous phase, are dispersed in water, the continuous phase. The term *water-in-oil* indicates that droplets of water, the discontinuous phase, are dispersed in oil, the continuous phase.



Oil in water (o/w)

Water in oil (w/o)

The general term *oil* includes oils, fats and waxes. In addition to water and oil, these emulsions also contain wetting and emulsifying agents, such as Tweens, Spans, Tritons, spermaceti and gum tragacanth, and preservatives to prevent mold growth. Common preservatives are methylparaben and propylparaben, the methyl and propyl esters of hydroxybenzoic acid. The emulsions may contain a suspending agent, such as methyl cellulose, and perfumes.

The terms *salve*, *ointment* and *cream* indicate preparations that have in common the properties of being semisolids which are spread easily on skin. While these terms can be used interchangeably, they are sometimes thought to represent gradations in viscosity, the salve being considered most viscous, the ointment less and the cream least.

Indication: The O/W emulsions are indicated when vehicles which are penetrating, water washable and not greasy to the

touch are desired. They may be preferred for cosmetic reasons. For lesions on the scalp, they are most suitable because they can be easily washed out of the hair. For protection against ultraviolet light O/W vehicles seem to be the most effective. The W/O emulsions are used to provide lubrication and are especially indicated when the skin is dry. O/W or W/O preparations are required for penetration of drugs. Penetration with all bases is greatly increased if nonionic surface active agents such as Tween or Span, are present. Consequently, drugs incorporated into bases containing these agents must be used in smaller concentration than otherwise. The inert oil bases are used when an occlusive layer on the skin surface is needed. Some of the inert oil bases can be defatting because

the base is more oily than O/W or W/O compounds. To prevent heat loss as occurs in an extensive, chronic, exfoliative dermatitis, petrolatum or the W/O bases are best. For most antibiotics, inert oil or W/O bases offer greater stability than O/W emulsions. Carbowax differs from the other inert oils, such as petrolatum and mineral oil, in being miscible with water either from the skin or from other sources. By mixing inert oils with O/W or W/O emulsions, bases with combinations of properties—such as lubrication, penetration and protection—can be achieved.

At present it is not possible to list completely the specific ointment in which to put a particular drug for the best treatment of a given disorder. There have been few systematic attempts to evaluate the influence of the ointment base on penetrability or therapeutic effectiveness of a drug. More studies must be done using paired controls. With this method it was found that in the case of psoriasis petrolatum was a better ointment in which to incorporate drugs than other bases. By measuring the local skin reaction produced after incorporating an irritating substance such as corrosive sublimate (HgCl_2) in a base, it was found that a positive reaction occurred with many bases but a negative one with Carbowax. Thus in one experiment Carbowax did not allow

release of enough corrosive sublimate to react with the skin

The surface active agents such as Tween and Span increase the penetration of drugs. For example, if a sensitizing agent such as paraphenylenediamine is incorporated into 2 bases—one containing Tween and one without Tween—the skin shows more reaction to the base containing Tween. In addition it is possible with the aid of these detergents to detect a sensitivity reaction where none was evident before the base containing Tween was applied. In all probability Tween facilitates the penetration of the sensitizing agent into the skin.

SOME KNOWN INDICATIONS FOR VARIOUS OINTMENT BASES

O/W	W/O	Inert Oil
1 Ultraviolet screening agents ✓	1 Lubrication	1 Retain heat
2 Scalp preparations ✓	2 Retain heat	2 Antibiotics
3 Penetration desired	3 Penetration desired	3 Psoriasis
4 Cosmetic elegance	4 Antibiotics	
	5 Psoriasis	

Perhaps in the future attempts will be made to determine the base that allows for greatest absorption of a given drug and the base that makes possible the greatest therapeutic effect of a drug or mixture of drugs. Only after these data are obtained can it be decided which base to use to produce a good therapeutic response.

Mode of action. As a vehicle for incorporated drugs, the water in oil types of ointment and inert oils occlude the skin surface. This leads to suppression of evaporation and swelling of the cells in the horny layer which may allow for greater penetration of drugs incorporated in the ointment. The oil in water or water-washable bases enable the added drugs to penetrate by effecting close contact with the skin cells. Ointments also carry drugs into the sebaceous glands, where they may have a local effect or be absorbed into the systemic circulation. As mentioned previously, the surface active agents increase penetration.

Vanishing creams are oil in-water emulsions which disappear without forming clumps upon application to the skin. These creams usually contain stearic acid and a relatively high percentage of water.

Cold creams are oil-in-water or water-in-oil emulsions

characterized by a preponderance of oil. They are the cosmetic creams such as night cream, emollient cream, cleansing cream and all purpose cream. Cold cream itself is commonly made with mineral oil, beeswax, water and borax. The creams usually have an alkaline reaction because a soap is formed from borax and beeswax. Cleansing and liquefying properties may be increased by the use of a smaller percentage of wax and a higher percentage of mineral oil. An emollient or night cream contains less wax or mineral oil, which is compensated for by an equivalent amount of vegetable oil, animal oil or fat.

OIL-IN-WATER OR WATER WASHABLE BASES

Almay Emulsion Base (Almay)

This base contains fatty acid and glycol esters, spermaceti, cetyl alcohol, propylene glycol and water.

Unibase (Parke Davis)

Unibase contains higher fatty alcohols, petrolatum, glycerin, water and an emulsifying agent.

Neobase (Burroughs Wellcome)

Neobase contains polyhydric alcohol esters, propylene glycol, water and a small amount of liquid petrolatum. As a preservative against molds, 0.3% methyl p-hydroxybenzoate is present. The pH is approximately 3.4.

Dermabase (Marcelle)

Dermabase contains stearyl alcohol, glyceryl monostearate, spermaceti, propylene glycol, mineral oil, water, a preservative and an emulsifying agent.

Cetaphil (Texas Pharmacol)

Cetaphil contains cetyl alcohol, stearyl alcohol, propylene glycol, sodium lauryl sulfate and water.

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and more occlusive effect, "anhydrous lanolin" should be specified

Hydrosorb (Abbott)

Hydrosorb is a mixture of the oleic acid ester and amide of diethanolamine, oleic acid and white petrolatum

Polysorb (E. Fougera)

Polysorb contains sorbitan sesquioleate in a wax petrolatum mixture

Velvachol (Texas Pharmacol)

Velvachol contains cholesterol, sodium lauryl sulfate, cetyl alcohol, stearyl alcohol, petrolatum, mineral oil and water

Qualatum (Almoy)

Qualatum contains 93% of a mixture of petrolatum and mineral oil and 7% polyhydric fatty acid esters

INERT OIL

Yellow Petrolatum

Petrolatum, or petroleum jelly, is a purified mixture of semisolid hydrocarbons obtained from petroleum

White Petrolatum

White petrolatum, or white petroleum jelly, is petrolatum wholly or nearly decolorized. Usually no chemicals are used for decolorization. Yellow petrolatum is repeatedly passed through a filter bed of bauxite or fullers' earth at 120-200° F to remove coloring matter

Carbowax Ointment (Union Carbide & Carbon)

Carbowax 1,500	55%
Carbowax 4,000	20%
Polyethylene glycol 300	25%

The Carbowaxes and polyethylene glycols, which are soluble in water, are mixtures of polymers having the formula

Multibase (Ar Ex)

Multibase contains saturated aliphatic alcohols, polyhydric alcohols, lauric acid esters, petrolatum, water and an emulsifying agent

Lubriderm (Texas Pharmacal)

Lubriderm contains cholesterol esters of lanolin, mineral oil, sorbitol, triethanolamine stearate, cetyl alcohol, butyl parahydroxybenzoate and water

WATER IN OIL BASES**Aquaphor (Duke)**

Aquaphor is a hydrophilic, but not water washable ointment containing 6 parts of a mixture of esters and alcohols of cholesterol isolated from wool fat and 94 parts of petrolatum. When water is added to Aquaphor, a water in-oil base is obtained

Eucerine (Duke)

Eucerine is an emulsion of equal parts of Aquaphor and water, plus a small amount of glycerin to enhance stability in cold climates

Nivea (Duke)

Nivea cream is scented Eucerine

Nivea oil is an emulsion of cholesterol alcohols from wool fat and their benzoic acid esters in a paraffin base and water. 30-60 ml of Nivea oil may be added to the bath tub for bathing when the patient has dry skin

Lanolin

Lanolin is wool fat with 25-30% water. Naturally occurring wool fat (anhydrous lanolin) contains cholesterol and ischolesterol esters of the higher fatty acids. For a greasier

ointments except that pastes do not prevent the removal of water or insensible perspiration to as great an extent. Hence, incorporated drugs exert a milder action. Compared with ointment bases, pastes are relatively poor vehicles for penetration of an incorporated drug. They absorb some fluid from lesions. Because of their heavy consistency, pastes, when covered with dressings, provide a protective layer through which it is difficult for the patient to scratch and excoriate his skin.

Application. Pastes should be spread on a moist surface with a

brush or the back of a spoon. The caking of the paste resulting from evaporation of water and to protect against scratching when pruritus is present. A suitable dressing consists of one layer of soft linen covered by wrappings of gauze or elastic bandages. The dressing should be changed in 24 or 48 hours. Cotton saturated with mineral or vegetable oil can be used to remove the paste. Water is not effective. Care should be taken not to traumatize the underlying skin. It is neither necessary nor desirable to remove all the paste in cleansing. The purpose of cleansing is to keep the paste from becoming too thick with repeated applications.

Pigmenting and Depigmenting Agents

THE COLOR OF A MELANOCYTE depends largely on (1) the amount of melanin in the cell, (2) the state of dispersion of the melanin granules in the melanocyte. Experimentally, many substances can lighten and darken melanocytes. However, from a practical standpoint, at present only one agent, monobenzyl ether of hydroquinone, is used to depigment skin. And one agent

$\text{HOCH}_2(\text{CH}_2\text{OCH}_2)_n\text{CH}_2\text{OH}$ The number after the Carbowax or polyethylene glycol indicates its approximate molecular weight. Polyethylene glycols range in molecular weight from 200 to 700 and are liquids. Carbowaxes range in molecular weight from 1,000 to 6,000 and are solids. The lower the molecular weight, the less the viscosity of the polyethylene glycol and the lower the melting point of the Carbowax. The consistency of the ointment preparation may be varied by altering the ratio of the ingredients.

Plastibase (Squibb)

Plastibase contains 95% heavy mineral oil and 5% polyethylene plastic resin. The mineral oil is dispersed in a matrix of submicroscopic interstices produced from the plastic.

Mineral Oil

Mineral oil, or liquid petrolatum, is a mixture of liquid hydrocarbons obtained from petroleum.

PASTE

The term *paste* is not well defined. Older concepts held that a paste was a mixture of 50% powder and 50% ointment. Nowa days many pastes contain 20–30% powder instead of 50%.

ZINC OXIDE OR LASSAR'S ZINC PASTE

Zinc Oxide	25%
Starch	25%
White petrolatum	50%

Lassar's original zinc paste was not the formula given here but differed chiefly in that it contained 2% salicylic acid.

Indication In general, pastes are not used as frequently as ointments because of difficulty in applying and removing them. They are not as attractive cosmetically and in addition require bandaging. However, pastes are good therapeutic agents when used properly and are believed by some to be better than ointments. Pastes adhere well to the skin and do not interfere appreciably with perspiration.

Mode of action The action of pastes is similar to that of W/O

ointments except that pastes do not prevent the removal of water or insensible perspiration to as great an extent. Hence, incorporated drugs exert a milder action. Compared with ointment bases, pastes are relatively poor vehicles for penetration of an incorporated drug. They absorb some fluid from lesions. Because of their heavy consistency, pastes, when covered with dressings, provide a protective layer through which it is difficult for the patient to scratch and excoriate his skin.

Application Pastes should be spread evenly, preferably with a

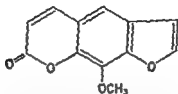
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psoralen plus ultraviolet light is not useful in all patients with vitiligo

Methoxsalen (Oxsoalene, Elder, Meloxine, Upjohn)



8 Methoxypsoralen
(8 MOP, methoxsalen, Oxsoalene, Meloxine)

Mode of action Some aspects of the mechanism of action of the psoralens were discussed in the section on Light Protective Agents. The process by which the psoralens in conjunction with sunlight produce repigmentation in vitiligo is not known. Recent experiments on vitiligo suggest that the depigmentation is due to the release of a substance like melatonin at the peripheral nerve endings which in turn can cause lightening in color of pigment cells. It is possible that psoralens plus sunlight destroy the vitiligo producing agent and allow for subsequent repigmentation.

Administration 10-20 mg of 8-MOP is ingested 1 to 3 hours before exposure to sunlight or ultraviolet light from a lamp. Since 8-MOP is ineffective unless its ingestion is followed by exposure of the skin to ultraviolet light, the drug should not be given unless light exposure is possible. (See section on Light Protective Agents for more details.)

Erythema Treatment should be continued for at least 3 months. Exposure to sunlight is better than exposure to light from an artificial source. At times the patients complain of dryness of the skin. A bland lubricating ointment is usually effective in alleviating this condition.

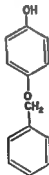
Not all areas of vitiligo repigment with equal facility. As a rule, fleshy areas such as the arm, neck and face, repigment better than bony prominences such as the backs of the hands,

elbows and knees. Some physicians have the impression that repigmentation takes place more readily in children than in adults and that patches of vitiligo of less than 2 years' duration repigment better than older lesions. The physician should make an effort to use 8-methoxypsoralen and ultraviolet light in the treatment of only a select group of patients with vitiligo. The patient must be conscientiously able to follow long term treatment and in a position to obtain adequate exposure to sunlight for at least 3 months of the year.

Many patients seek therapy at a time when the vitiligo is

has been obtained during 3 months of therapy in the summer, some patients are instructed to hold off further treatment until spring thus allowing the skin to lighten during the winter.

Benoquin (Elder)



Benoquin
(Monobenzyl ether of hydroquinone)

Indication Benzoquin is used in treatment of hyperpigmentation due to increased melanin, such as that in postinflammatory states, freckles, generalized lentigines, berloque dermatitis, melasma (chloasma) of pregnancy, Addison's disease and chronic malnutrition (Richl). It is useful to

depigment the remaining areas of normal pigmentation in patients with vitiligo when prospects for repigmentation are not good. Benzoquin is of little value in the treatment of café-au-lait spots and pigmented nevi. It is not effective in malignant melanomas. Mild freckling should not be treated, because the incidence of sensitization to Benzoquin is high, being 13%. Benzoquin should not be used in deeply pigmented persons, such as Negroes, because areas of leukoderma may form. Such depigmentation is not always reversible.

Mode of action: Benzoquin does not affect the enzymic formation of melanin, but some of its breakdown products may do so. It has been suggested that hydroquinone is formed from Benzoquin in the skin and that this is the agent which inhibits melanin formation.

Application: The ointment should be applied 1 to 2 times daily to areas of hyperpigmentation. Depigmentation is usually observed after 1 to 6 months of therapy. If a sensitization reaction develops, the 20% ointment may be diluted with an O/W base to 5% and applied once daily or less often. The 5% ointment, although effective, requires a longer time for therapeutic effect than the 20% concentration.

Available as Benzoquin ointment, 20% concentration in a water-washable base in 1¼ oz. tubes, and as Benzoquin lotion, 5% concentration in 4 oz. bottles.

Poison Ivy Hyposensitization

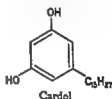
THE PHYSICIAN is frequently asked about prophylactic desensitization to poison ivy, oak, sumac, etc. A highly sensitive person cannot be completely desensitized to poison ivy leaves by conservative oral prophylaxis. However, some degree of hyposensitization can be achieved. The protection is partial. Various claims have been made for several oral and injectable products for hyposensitization. In general, hyposensitization is not a worth-

while procedure for most patients with poison ivy, however, for those persons who develop a severe contact dermatitis from these plants, oral hyposensitization should be attempted. The benefits are (1) a briefer course, (2) less dissemination and (3) reduced dermatitis. The last two are dependent on exposure and original sensitivity. None of the preparations described below should be given for the treatment of active poison ivy dermatitis. Treatment should begin during the month of February.

Cashew Nut Shell Oil (Method of Kligman)

Cashew nuts are obtained from the cashew tree, *Anacardium occidentale*, which is related immunologically to other

leased by heating the nuts. Three groups of allergens present in this oil are (1) anacardic acid, (2) cardanol and (3) cardol.



Each of these agents is a mixture of four substances having

with weak sulfuric acid to remove mineral salts and amines. The washed shell oil is prepared for use as follows:

Cashew nut shell oil	100
Aerosol OT (American Cyanamid)	2.5
Tenox II (Eastman Kodak)	0.1
Ethyl alcohol	90.0

*Cashew nut shell oil can be obtained from the Irvington Chemical Division of the Minnesota Mining and Manufacturing Co., Newark 5, N. J.

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1 50 dilution First week	$\frac{1}{2}$ the maximum number of drops ingested when bottle of 1 100 dilution was exhausted
Second and following weeks	Increase the daily number of drops as rapidly as tolerance permits until 1 50 dilution is completed
1 25 dilution First week	$\frac{1}{2}$ the maximum daily dose of previous concentration Increase dosage as tolerance permits until 1 25 dilution is completed

A maintenance dose of 1 capsule (12 drops) of 1 25 dilution of oleoresin should be taken 2 or 3 times weekly. Side reactions include pruritus ani, generalized pruritus, erythematous eruptions, etc.

Available in a treatment set consisting of three 15 ml bottles of oleoresin in the following dilutions 1 100, 1 50 and 1 25. Gelatin capsules are provided which can be filled with the requisite amount of oleoresin oil from the dropper bottle for ingestion.

Oleoresin in Alcohol (Milder Research)

This preparation is an extract of poison ivy leaves and stems in 70% ethyl alcohol.

Dose 5 drops in $\frac{1}{4}$ glass of water, milk or fruit juice for 6 weeks before the poison ivy season, then 3 times a week during the season.

Protective Ointments Against Water and Oil

MANY PREPARATIONS ARE available to protect the skin against water and oil. Plain petrolatum is more effective than many more expensive products. The addition of silicones to petrolatum,

Aerosol OT is a wetting agent Tenox II is an antioxidant

DOSAGE PLAN

First week	1 drop daily
Second week	2 drops daily
Third week	3 drops daily
Fourth week	4 drops daily, thereafter increase by 1 drop every 4 days to a total of 20 drops daily, continue at this final dose until a total of 35 ml has been taken

The drops are added to a full glass of warm water or other liquid, stirred and drunk with a glass or disposable straw. The oil forms a milky emulsion in water. The water should not be ice cold, lest the emulsion break. After the first week the daily dose is split into a morning and evening portion as this division lessens side reactions. The liquid should not touch the glabrous skin. The most common side reactions are skin

age cour
to wane
summer
maunder

year, or hyposensitivity may be perennially maintained by taking 5 drops of 10% cashew oil daily

Oleoresin in Corn Oil (Hugh Graham Inc)

Oleoresins are available in corn oil for ingestion to reduce sensitivity to contact with poison ivy and other plants. The required amount of oil can be ingested in from 1 to 4 months. Rapidity of increasing dosage depends on individual tolerance.

DOSAGE PLAN

1 100 dilution	
First week	1 drop daily
Second week	2 drops daily
Third and following weeks	Increase daily number of drops as rapidly as tolerance permits until contents of 15 ml bottle of 1 100 dilution have been ingested

feeling. This is one of the reasons they are mixed with other substances before being put on the skin. We have found that the pure dimethyl siloxane polymer of 1,000 centistoke viscosity is an ideal liquid to use for protective purposes. This liquid can be purchased from Dow Corning or General Electric.

Domecone (Dome)

Dimethyl siloxane of 1,000 centistoke viscosity	20%
Water washable base	80%

OTHER PROTECTIVE AGENTS

Tecto (Duke)

This preparation consists of Eucerine with the addition of paraffin wax as a stiffening agent. No perfumes are present.
Available in 120 Gm tubes and 1 lb jars

Kerodex (Ayerst)

Two preparations are available. Kerodex 51 for dry work, Kerodex 71 for wet work. Neither contains silicone. They are made of mixtures of zinc stearate and oxide, kaolin, magnesium silicate, fullers' earth, cholesterol alcohols and esters, petrolatum and other substances.
Available in 4 oz tubes

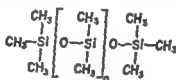
Psoriasis Preparations

PSORIASIS IS A METABOLIC DISEASE of the skin in which the specific biochemical defect is unknown. However, there are 2 interesting points that may shed light on its etiology. Substances which combine with or inactivate sulphhydryl groups tend to bring about a remission, e.g., radiant energy, heavy metals and organic oxidizing compounds. Even though this association does not establish

paraffin oil, castor oil, etc., enhances the resistance of these substances to solvents

SILICONES

Silicones provide a chemically inert film to protect the skin against water and chemicals. They are of particular value in soap and water dermatitis, diaper rash, decubitus ulcers, areas surrounding colostomy openings, etc. The silicones are less effective against oils and solvents. They are not miscible with water. They possess much of the stability of glass, quartz and the mineral silicates, to which they are related chemically. The skin should be clean and dry before use of silicones. A thin film of the preparation should be applied to the skin before exposure to fluids.



Polymers of dimethyl siloxane units
(Dow Corning 200 fluids)

The average length of the chain determines the viscosity of the fluid. The longer the polymer, the more viscous the silicone.

Silicote Ointment (Arnar Stone)

Dimethyl siloxane of 60,000 centistoke viscosity	30%
White petrolatum	70%

Available in 60 Gm tubes and 1 lb jars.

Silicote Liquid Spray (Arnar-Stone)

Dimethyl siloxane of 350 centistoke viscosity	33 1/3%
In a petrolatum base with Freon propellant	

Available in 3 oz cans

Liquid Silicone

The dimethyl siloxane polymers vary in viscosity depending on the length of the chain. Most pure silicones have a tacky

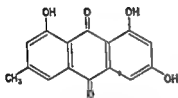
- 3 Ammoniated mercury 5%
 Salicylic acid 2%
 In a washable or petrolatum base
 HgNH_2Cl

Ammoniated mercury (mercury amino chloride)
 Available on prescription

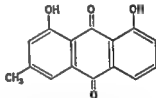
- 4 Ammoniated mercury 10%
 Salicylic acid 5%
 Phenol 5%
 In a washable or petrolatum base
 Available on prescription

- 5 Salicylic acid 1-5%
 In a washable or petrolatum base
 Available on prescription

- 6 Chrysarobin 0.25-2.0%

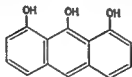


Emodin



Chrysophanic acid

- 7 Anthralin 0.1-0.5%
 In petrolatum or as solution in flexible collodion
 Anthralin is related in structure to emodin and
 chrysophanic acid, which are found in chrysarobin



Anthralin

Available on prescription.

an etiologic relationship between the metabolism of sulfhydryl containing compounds and psoriasis, it is a point to remember. A second interesting point is that light makes lupus erythematosus worse, but chloroquine improves it. The reverse is true for psoriasis—light improves psoriasis and chloroquine makes it worse.

In this section are commonly used preparations containing tar, salicylic acid, mercury, phenol, etc. In addition, information is given regarding ACTH, triamcinolone, aminopterin, methotrexate and nitrogen mustard.

The various tar preparations contain polyphenolic substances and peroxides which might inactivate epidermal sulfhydryl groups. Thus their effect on skin is similar to that produced by exposure to radiant energy. The effect of tar is enhanced when skin to which tar has been applied is exposed to ultraviolet light. Ultraviolet light seems to potentiate the oxidizing properties of tar.

Mercury usually is made available in the form of ammoniated mercury and mercuric salts of fatty acids. Even though mercury compounds are very sensitizing they are useful because of their pronounced therapeutic value. It is possible that these mercuric compounds are effective because they combine with sulfhydryl groups in the skin.

Salicylic acid is a keratolytic agent and hence is useful in the removal of scales from psoriatic patches. Through some unknown mechanism it also promotes normal keratin formation.

The actions of phenol, cresol, anthralin and chrysarobin are unknown. Whether allantoin has a beneficial effect on psoriasis remains to be seen.

SKIN CARE

TEN COMMON AGENTS FOR PSORIASIS OF THE GLABROUS SKIN

- | | |
|----------------|----|
| 1 Tar | 3% |
| Salicylic acid | 5% |

- 2 Liquor carbonis detergens, full strength
Available in 3, 8 and 16 oz bottles and in a 2 oz aerosol spray

TAR AND ULTRAVIOLET LIGHT PROCEDURE

- 1 In the morning, rub thin layer of tar ointment into involved skin areas. If the tar layer is thick, ultraviolet light will not penetrate to the epidermal cells
- 2 Expose skin to ultraviolet light (See section on Ultraviolet Light for exposure schedule)
- 3 One hour (or more) after ultraviolet light exposure, bathe and rub scaly lesions vigorously with a brush and some cleaning agent
- 4 After bathing, rub ample amount of tar into involved areas
- 5 Reapply tar liberally at bedtime
Repeat above procedure daily and increase the intensity of light striking the skin daily

SYSTEMIC AGENTS

ACTH

Injection of ACTH usually results in improvement in psoriatic lesions. This therapy is not practical for routine use because daily injections are required, and serious side effects occur with prolonged therapy (See section on Steroids and ACTH)

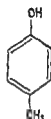
Triamcinolone (Aristocort Kenocort)

Like ACTH, triamcinolone in sufficient doses can bring
 This effect
 the patient
 of triam
 cinolone, and if the maintenance dose is 4-8 mg daily, this
 steroid can be used in management of some patients. Un
 fortunately, most require a daily maintenance dose of more
 than 8 mg. With prolonged therapy, even in small doses,
 triamcinolone produces weight loss and moon facies. When
 therapy is discontinued, psoriatic lesions may recur (See
 section on Steroids and ACTH)

- 8 Ruasol (Shield)
 Mercury soaps
 $(\text{RCOO})_2\text{Hg}$ 0.45%
 Phenol 0.5 %
 Cresol 0.75%
 In a lotion base



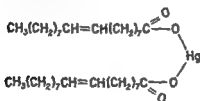
Phenol



Cresol

Available in 4 and 8 oz bottles

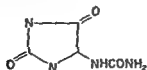
- 9 Siroil (Siroil)
 Mercuric oleate 0.4%
 Cresol
 In a lotion base



Mercuric oleate

Available in 11 oz bottles

- 10 Alphosyl (Reed and Carnrick)
 Allantoin 2%
 Coal tar extract 5%
 In lotion form



Allantoin

Allantoin is a product of purine metabolism
Available in 8 oz bottles

reactions. It is not known how Aminopterin exerts its beneficial effects in psoriasis. It is possible that folic acid is needed for the formation of keratin proteins and that Aminopterin interferes with the keratinizing process.

Dose: One 0.5 mg tablet by mouth daily, not exceeding 6 mg total dose in a period of 12–20 days. A common schedule would be 1 tablet daily for 3 days followed by 1 week's rest and then 1 tablet daily for another 6 days. Or the patient could be given 1 tablet daily for 12 days. The white count should be checked weekly.

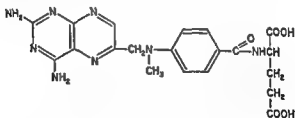
Available in 0.5 mg tablets

Side effects: Toxic reactions occur in 10% of the patients. Toxic effects coincide with improvement of psoriasis and include ulceration of the buccal mucosa, diarrhea, abdominal cramps, alopecia, decrease in need for shaving and delay in wound healing.

Antidote: Folic acid (leucovorin) may be used to counteract inadvertent overdosage of Aminopterin.

Dose: 1–2 ml (3–6 mg) intramuscularly given immediately. May not be effective if given more than 4 hours after folic acid antagonists.

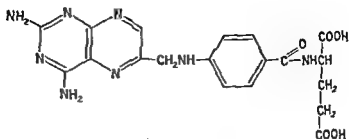
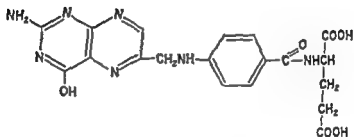
Methotrexate (Lederle)



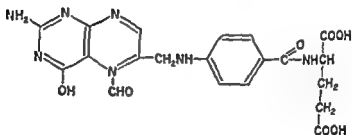
Methotrexate
(4-Amino-N¹⁰-methyl pteroylglutamic acid)

This folic acid antagonist is related to Aminopterin in structure. Although it is given in 5 times the concentration of Aminopterin, its toxic reactions are less.

Aminopterin (Lederle)

Aminopterin
(4 aminopteroylglutamic acid)

Folic acid



Folinic acid

Comparing the structural formulas of folic acid and Aminopterin reveals an OH group on one of the rings in folic acid and an NH₂ group at this same site in Aminopterin. Folic acid is converted to folinic acid (citrovorum factor), which participates in several biochemical reactions. Aminopterin competes with folic acid to prevent its conversion to folinic acid, and it also competes with folinic acid in its biochemical

reactions. It is not known how Aminopterin exerts its beneficial effects in psoriasis. It is possible that folic acid is needed for the formation of keratin proteins and that Aminopterin interferes with the keratinizing process.

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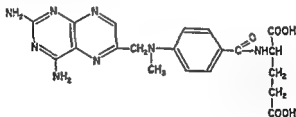
Available in 0.5 mg tablets

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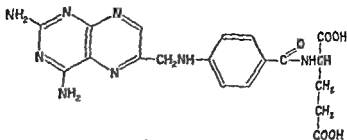
Dose 1–2 ml (3–6 mg) intramuscularly given immediately. May not be effective if given more than 4 hours after folic acid antagonists.

Methotrexate (Lederle)

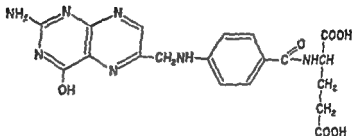


Methotrexate
(4-Amino-10-methyl pteroylglutamic acid)

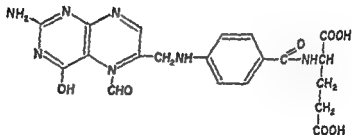
This folic acid antagonist is related to Aminopterin in structure. Although it is given in 5 times the concentration of Aminopterin, its toxic reactions are less.

Aminopterin (Lederle)

Aminopterin
(4 aminopteroylglutamic acid)



Folic acid



Folinic acid

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NAIL CARE

Mercury

Ammoniated mercury	20%
In a washable base	

Apply to the nails twice daily
Available on prescription

Gelatin

The use of gelatin as outlined in the treatment of brittle nails is of questionable value in psoriasis

X Ray

The dorsal surface of the entire hand or just the fingers, may be treated with 100 kv, 2 mm aluminum, for a total dose of 220 r This can be repeated once after 1 month
DO NOT REPEAT THEREAFTER

Rosacea Preparations

MANY AGENTS USED for the treatment of common acne are helpful in rosacea These include lotia alba, salicylic acid resorcinol alcohol etc (See section on Acne Preparations) In addition the following ointments available on prescription, are used to treat rosacea They should be applied nightly Their mode of action is not known

Sulfur Sal Quinoline Ointment

Sulfur	1%
Salicylic acid	1%
In Quinolol Vioform or Sterosan ointment	

Dose Follow the schedule given for Aminopterin, substituting a 25 mg tablet of Methotrexate for 05 mg Aminopterin
Available in 25 mg tablets

Nitrogen Mustard

It is possible that nitrogen mustard may be of benefit. However, this drug should be used only in the exceptional patient with extensive and refractory psoriasis (See section on Nitrogen Mustard Therapy)

SCALP CARE

Care of the scalp consists in the application of tar, mercury and phenol products as well as ultraviolet light irradiation (See section on Ultraviolet Light). At bedtime one of the following preparations should be rubbed into the scalp thoroughly and allowed to remain during the night. The next day the scalp may be washed and brush scrubbed with tincture of green soap or other shampoo. This treatment should be carried out daily for 2 to 3 days and then twice weekly.

Tar-Mercury Ointment

Ammoniated mercury	3-12%
Salicylic acid	1-5%
Coal tar (Zetar, Almay, LCD)	2-10%
In a water washable base	

Mercury may be omitted when patients are sensitive to this metal.

Available on prescription

Pragmatar (Smith, Kline & French)

See section on Seborrheic Dermatitis Preparations

P & S Liquid (Baker)

Phenol	1%
Saline	

Available in 4 and 8 oz bottles

Seborrheic Dermatitis Preparations

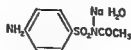
THE OLD STANDBYS FOR treating seborrheic dermatitis, namely, sulfur, tar and ammoniated mercury, are being replaced by drugs which are not only more effective but also more acceptable to the patient from a cosmetic standpoint. Nevertheless, the older compounds are still useful. It is of interest that different types of agents are valuable in treating seborrheic dermatitis: steroids, chemotherapeutic drugs, sulfur, tar and ammoniated mercury. Combinations of these substances are available. For the treatment of acute, extensive seborrheic dermatitis, systemic therapy with steroids or ACTH should be given. The preparations below, suggested for treatment of seborrheic dermatitis of the skin, should be applied 2 to 3 times daily. For treatment of the scalp, Sebizon, Pragmatar, etc., are applied at bedtime in ordinary cases and during the day as well in severe cases.

Hydrocortisone Derivatives

Steroids in lotion or ointment form, are often effective in the treatment of seborrheic dermatitis (See section on Steroids and ACTH)

Sebizon (Schering)

Sodium sulfacetamide 10%
with a wetting agent in a lotion base of polyethylene glycol esters to prevent crystallization of the sodium sulfacetamide on the hair



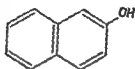
Sodium sulfacetamide

Caution Contact dermatitis to sodium sulfacetamide sometimes occurs

Available in 3 oz plastic squeeze tubes

Beta-Naphthol Ointment

Beta naphthol	0.55%
Sublimed sulfur	11%
In equal parts balsam of Peru and petrolatum	

*B Naphthol*

Sublimed sulfur is obtained directly through the sublimation of crude sulfur. Balsam of Peru is a liquid obtained from *Myroxylon pereirae*. It contains 50–60% cinnamoin, a volatile oil to which its therapeutic properties are attributed. Cinnamoin consists of the esters of benzoic and cinnamic acids. There is 28% resin, styracin and vanillin.

In the past, when rosacea was thought due to *Demodex folliculorum*, this formula, a known scabicide, was proposed to see whether it would work as destructively on *Demodex* as on *Acarus scabies*. Although the *Demodex* etiology of rosacea has not been substantiated, this formula has been retained for treatment of rosacea because of its therapeutic effectiveness.

Application Rub onto face nightly. A burning sensation is to be expected. Observe patient the day following every third application because of possible occurrence of dermatitis.

Darier's Paste

Precipitated sulfur	6.0 Gm
Resorcinol	2.0 Gm
Zinc oxide	8.0 Gm
Starch	8.0 Gm
Yellow petrolatum	10.0 Gm
Lanolin	10.0 Gm

Soaps, Shampoos and Baths

SOAPS

SOAPS EMULSIFY FATS with water and help remove dirt particles

acids with a strong base. Such a soap hydrolyzes in water to produce a definitely alkaline pH. Solutions at alkaline pH are good protein solvents and tend to dissolve keratin. In many dermatologic disorders the skin already is more alkaline than under normal conditions. Therefore, adding ordinary soap to damaged skin may keep a vicious circle going.

When a patient says that he is sensitive to soap he does not usually mean that there is an acute allergic reaction but rather that some other factor is causing the skin to be irritated.

problem and to get a cleansing agent that can be tolerated by these patients, one must find a soap that is at a neutral or acid pH. Another approach would be to use a less efficient alkaline soap, such as a superfatted one.

NEUTRAL SOAPS AND SOAP SUBSTITUTES

As mentioned before, soaps are ordinarily sodium or potassium salts of fatty acids. These salts of strong bases and weak acids hydrolyze in water to form a basic solution.

surfactants (Dove, Lowila, Dermolate, pHisoderm and Soy Dome) consist of long chain esters with a sulfate salt at the end of the molecule. These sulfate salts are derived from strong acids. They

Metimyd Ointment with Neomycin (Schering)

Sodium sulfacetamide	10 %
Prednisolone	0.5 %
Neomycin sulfate	0.25 %

In a petrolatum type base

*Available in 1/8 oz applicator tube***Pragmatar (Smith, Kline & French)**

Cetyl alcohol coal tar distillate	4 %
Micronized sulfur	3 %
Salicylic acid	3 %

In oil in water emulsion base

*Available in 1 1/2 oz jars***Sulfur Ointment**

Precipitated sulfur	2-10 %
Salicylic acid	1-2 %
Tar	2 %

In an ointment base

*Available on prescription***Ammoniated Mercury Ointment**

Ammoniated mercury	5 %
Salicylic acid	1-2 %

In an ointment base

*Available on prescription***Antibiotic Ointments**

Bacitracin	Neosporin
Neopolycin	Spectrocin

These antibiotics are available with or without steroids
(See the section on Chemotherapeutic Drugs)

Soaps and Shampoos

In seborrheic dermatitis, these soaps and shampoos are often helpful. They are described in the following section on Soaps, Shampoos and Baths

SOAPS	SHAMPOOS
Acne Aid	Capsebion
Fostex (bar or cream)	Duonal
Sulpho Lac (bar or cream)	Sebulex
Tar soap	Selsun
	Tincture of green soap

Soaps, Shampoos and Baths

SOAPS

SOAPS EMULSIFY FATS with water and help remove dirt particles

sium salts of fatty acids produced by neutralizing weak organic acids with a strong base. Such a soap hydrolyzes in water to produce a definitely alkaline pH. Solutions at alkaline pH are good protein solvents and tend to dissolve keratin. In many dermatologic disorders the skin already is more alkaline than under normal conditions. Therefore, adding ordinary soap to damaged skin may keep a vicious circle going.

When a patient says that he is sensitive to soap he does not usually mean that there is an acute allergic reaction but rather that certain physical properties—such as high pH and cleansing action—tend to irritate and damage his skin. This situation pertains to most patients with eczematous eruptions. To correct this problem and to get a cleansing agent that can be tolerated by these patients one must find a soap that is at a neutral or acid pH. Another approach would be to use a less efficient alkaline soap, such as a superfatted one.

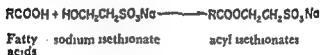
NEUTRAL SOAPS AND SOAP SUBSTITUTES

As mentioned before, soaps are ordinarily sodium or potassium salts of fatty acids. These salts of strong bases and weak acids hydrolyze in water to form solutions at a pH of 9 to 10. To obtain a soap of greater neutrality or acidity salts must be prepared by combining strong or weak bases with strong acids or by combining weak bases with weak acids. Most neutral soaps and soap substitutes (Dove, Lowila, Dermolate, pHisoderm and Soy Dome) consist of long chain esters with a sulfate salt at the end of the molecule. These sulfate salts are derived from strong acids. They

dissociate in water to give a pH of about 7 in the case of sodium sulfates and of less than 7 in the case of ammonium sulfates. The degree of dissociation of sulfate soaps is greater than that of ordinary soaps.

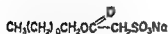
Dove Soap (Lever)

This bar consists of an anionic detergent, a fatty acid emollient, plasticizer and perfume. The anionic detergent is an acyl isethionate made by condensing fatty acids with sodium isethionate. The pH is 7.

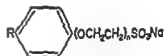


Lowila (Westwood)

Available as a bar or liquid, Lowila contains sodium lauryl sulfoacetate in a corn dextrin base acidified with lactic acid. The pH in solution is 4.0. Lowila liquid, used for washing dishes, laundry, etc., contains an alkyl aryl sulfonate acidified with lactic acid to a pH of 4.0-4.5.



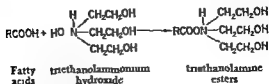
Sodium lauryl sulfoacetate



Alkyl aryl sulfonate

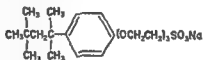
Neutrogena (Notone)

This bar is made by combining fatty acids with triethanolamine. Added glycerin makes the soap transparent. It is claimed that solutions of this soap have a pH of 7.5. However, 1% solutions we tested had a pH of 9.5.



pHisoderm (Winthrop)

This is a stable emulsion of sodium-p terocetyl-phenoxy-ethoxyethoxy ethyl ether sulfonate, petrolatum, lanolin, cholesterol and water and is free from alkalis and fatty acids. It has a pH of 5.5. It comes in three forms: regular for normal skin, only for dry skin and ichthyosis and dry for oily skin.



Sodium p-terocetyl phenoxy-ethoxyethoxy ethyl ether sulfonate

Dermolate (White)

Dermolate is a lathering cake detergent made from fatty acids by first methylating and then sulfating refined tallow. It has a pH of 8.4 and consists of

Sodium sulfato-octadecanoate	38%
Sulfato-octadecanoic acid	7%
Sodium stearate	38%
Perfume	0.075%
Water	9%



Sodium sulfato-octadecanoate



Sulfato-octadecanoic acid

Acidolate (White)

Acidolate is a nonlathering liquid skin detergent with a pH of 6.4. It is composed of

Sulfated rice bran oil	26.5%
Light mineral oil	20.5%
Water	53.0%

Aveeno Soap Substitute (Aveeno)

This product, a powder, consists of 65% Aveeno colloidal oatmeal in a petrolatum base. It contains no soap or wetting agent. The pH is approximately 6.0.

Soy-Dome Soapless Cleanser (Dome)

Available as a cream, Soy-Dome contains 10% soya flour, which is the meal of defatted and dehulled soy beans. The dry flour contains approximately 55% protein and is standardized to a particle size of 75 microns. Foaming and cleansing action are dependent on ammonium lauryl sulfate. Some ammonium myristyl sulfate is also present. The pH is 5.



Ammonium lauryl sulfate



Ammonium myristyl sulfate

SUPERFATTED SOAPS

Superfatted soaps contain added fat or oil for the purpose of preventing excessive defatting of dry skin. Such soaps probably are less drying than ordinary ones because their detergent properties are less. The better a detergent, the more defatting it is. Consequently, adding a fat to a detergent will not decrease the defatting properties of the detergent unless it makes it a less effective cleansing agent. Nevertheless, soaps that suds well and yet probably have reduced detergent action are useful for patients with dry skin.

Basis Soap (Duke)

This is a bar containing 2% of a mixture of cholesterol esters of lanolin and wool fat.

Oilatum Soap (Stiefel)

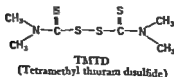
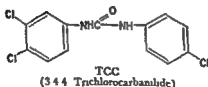
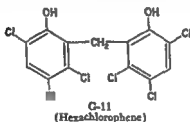
This lanolin free bar contains 7.5% peanut oil and is available scented or unscented.

Superfatted Soap (Stiefel)

This bar contains 6% lanolin.

GERMISTATIC SOAPS

Soaps with bacteriostatic agents have become increasingly popular for 2 reasons. First, they have been recommended as an adjunct to the treatment of pyogenic skin infections. Infections with staphylococcal antibiotic resistant organisms have become a severe medical problem. Cleaning agents that will reduce the likelihood of a staphylococcal skin infection are sought and widely used. Second these soaps are promoted as deodorants. In this regard they are effective because they inhibit organisms responsible for the production of odor in body folds. Most of the germistatic soaps are effective against gram positive organisms. Their activity against gram negative organisms is low. Bacteriostats commonly added to soaps are hexachlorophene (G-11), trichlorocarbanilide (TCC) and tetramethyl thuram disulfide (TMTD).



Dial Soap (Armour)

Initially, Dial soap contained 2% G-11. The present Dial soap contains 1.5% G-11 and 0.5% TCC. G-11 and TCC are a synergistic combination, and this mixture is more bacteriostatic than 2% G-11. It is formulated from the sodium salts of various fatty acids and has a pH of 9.7.

Zest (Proctor and Gamble), Lifebuoy (Lever), Praise (Lever)

The large soap manufacturers are now promoting soaps with bacteriostatic agents. The active agents have been changed from time to time. It has not been possible to obtain detailed information on the compounds used today. For example, Lifebuoy originally contained cresol. In 1953 the cresol was replaced by TMTD which in turn was replaced recently by another agent. The present Zest product contains TCC.

pHisoHex (Winthrop)

This liquid soap is the same as pHisoderm but with 3% G-11 added. It has a pH of 5.5.
Available in 5 and 16 oz. bottles.

Septisol (Vestal)

This liquid soap contains 0.75% G-11 or 2% G-11 based on soap content.

SOAPS AND SHAMPOOS FOR ACNE AND/OR SEBORRHEA

Acne-Aid (Stiefel)

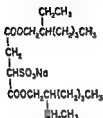
Sulfated vegetable oil	10.5%
Neutral soap	10.5%

Fostex (Westwood)

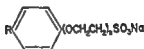
This cleansing agent contains keratolytic and drying agents.

Sebulytic (sodium dioctyl sulfosuccinate,
sodium lauryl sulfoacetate, so-

diuretic alkyl aryl polyether sulfonate)	
Micropulverized sulfur	2%
Salicylic acid	2%
Hexachlorophene (G-11)	1%
In a corn dextrin base	



Sodium dioctyl sulfosuccinate



Sodium alkyl aryl polyether sulfonate

Available as a cream in 4½ oz jars and as a bar

Sulpho-Lac (Kelgy)

This bar contains 10% colloidal sulfur in a soap made from coconut oil and white tallow

Tar Soap (Packers)

This soap contains 6% pine tar in a toilet soap base. It is recommended by some for use in place of ordinary cleansing soap in the presence of seborrhea, seborrheic dermatitis and psoriasis.

Capsebon (Pitman-Moore)

Capsebon is a suspension of 1% cadmium sulfide in a detergent base made up of triethanolamine lauryl sulfate and lauric acid diethanolamine condensate

CdS

Cadmium sulfide

Available in 4 oz. bottles.

Sebulex (Westwood)

This is a keratolytic shampoo which contains the same ingredients as Fostex cake and cream but is less drying because

Dial Soap (Armour)

Initially, Dial soap contained 2% G 11. The present Dial soap contains 0.5% G 11 and 0.5% TCC. G 11 and TCC are a synergistic combination and this mixture is more bacteriostatic than 2% G 11. It is formulated from the sodium salts of various fatty acids and has a pH of 9.7.

Zest (Proctor and Gamble) Lifebuoy (Lever) Praise (Lever)

The large soap manufacturers are now promoting soaps with bacteriostatic agents. The active agents have been changed from time to time. It has not been possible to obtain detailed information on the compounds used today. For example, *Lifebuoy originally contained cresol*. In 1953 the cresol was replaced by TMTD which in turn was replaced recently by another agent. The present Zest product contains TCC.

pHisoHex (Winthrop)

This liquid soap is the same as pHisoderm but with 3% G-11 added. It has a pH of 5.5.
Available in 5 and 16 oz bottles.

Septisol (Vestal)

This liquid soap contains 0.75% G 11 or 2% G 11 based on soap content.

SOAPS AND SHAMPOOS FOR ACNE AND/OR SEBORRHEA

Acne-Aid (Shefel)

Sulfated vegetable oil	10.5%
Neutral soap	80.5%

Fostex (Westwood)

This cleansing agent contains keratolytic and drying agents.

Sebulytic (sodium dioctyl sulfosuccinate)
and sodium lauryl sulfoacetate 30

Diol Shampoo (Armour)

This liquid contains 1% hexachlorophene (G-11), 25% triethanolamine lauryl sulfate, lanolin derivatives and water
Available in 3½ and 7 oz bottles

BATHS

For a therapeutic bath, the tub should be filled half full. In the average home bathtub, 75 liters (20 gal) of water will be adequate for this purpose. Full length hospital tubs may require 2 to 3 times this amount. For a sitz bath, 20-30 liters (5-8 gal) of water will suffice in either home or hospital tub. The temperature of the water should be approximately 95-100° F (35-38° C). The patient may be allowed to remain in the tub ½ hour. Debilitated patients should be watched carefully. At times it may be necessary to have the patient rest in a canvas sling suspended in the tub. The patient should be instructed to dry himself by patting gently with soft towels rather than by rubbing.

Colloid Baths

Colloid baths consist of proteins or starch in water and are used for their soothing and antipruritic effect. The mechanism of this action is not known.

- 1 *Aveeno* is a finely milled oatmeal preparation containing 24% protein, 9% oil and 46% starch. To minimize lumping, shake 1 cup of Aveeno and 2 cups of cold water in a container. For infants, use only 3
- 2 *Aveeno Oiled* consists of regular Aveeno oatmeal plus 35% of a mixture made up of liquid petrolatum and lanolin derivatives. This preparation is indicated for patients with dry skin when an emollient effect is needed.
Available in 10 oz. cans
- 3 *Soyaloid Colloid Bath* (Dome) contains 52% protein from soy beans.
Available in boxes containing five 3 oz packages

of the addition of a dewaxed oil-soluble fraction of lanolin
Available in 4 oz bottles

Selsun (Abbott)

This shampoo is a suspension which contains a detergent and 2.5% of a mixture of crystalline selenium monosulfide and solid solutions of selenium and sulfur in an amorphous form part of which could have the formula Se_nS_m , where $n + m = 8$. Selenium sulfide is made up of 2 elements which have some similar chemical properties and which occur adjacent to one another in the same group of the periodic table



Available in 4 oz bottles

Soft Soap (U S P)

Soft soap (green soap, medicinal soft soap, *sapo mollis*) is a potassium soap made by the saponification of vegetable oils excluding coconut oil, and palm kernel oil, without the removal of glycerin

Vegetable oil	380.0 Gm
Oleic acid	20.0 Gm
Potassium hydroxide (85% strength)	91.7 Gm
Glycerin	50.0 ml
Distilled water to make	1,000.0 Gm

The vegetable oil may be corn, cottonseed, linseed, olive, soy bean or a similar oil with a saponification value not greater than 205 and an iodine value not less than 80

Tincture of Green Soap Shampoo (soft soap liniment)

Medicated soft soap (see preceding)	65 Gm
Lavender oil	2 ml
Alcohol to make	100 ml

Adjunct: 2-5% crude coal tar or liquor carbonis detergens may be incorporated in tincture of green soap in the treatment of seborrhea, seborrheic dermatitis or psoriasis

- 3 *Gen Bath (Dermuk)* is a mixture of vegetable oils having a low index of unsaturation with an emulsifying agent
Available in 6 oz bottles

Tar Baths

30 ml (1 oz) of a liquid tar preparation (Zetar, Almay or LCD) may be added to the bath in cases of pruritus, psoriasis and seborrheic dermatitis (See section on Tar Preparations)

Potassium Permanganate ($KMnO_4$) Baths

A potassium permanganate bath is used in infected and weeping dermatoses and bullous eruptions, such as pemphigus

Do not use in open wounds or on the face

added to the tub The patient should get into the bath immediately so that his skin can benefit from the oxidizing properties of the potassium permanganate

For a 1:10,000 dilution, use twenty five 0.3 Gm (5 gr) tablets or 2 tsp of crystals For a 1:20,000 dilution, use twelve 0.3 Gm (5 gr) tablets or 1 tsp of crystals When tablets are used, they must be finely pulverized between 2 wooden tongue blades.

Steroids and ACTH

THE USE OF STEROIDS and antibiotics represents the most important advance in dermatologic therapy of this century The steroids have a pronounced effect on allergic reactions, eczemas, bullous eruptions and diseases of connective tissue In 1951 cortisone was made available commercially Since then the influx of new steroids has proceeded with unabated rapidity hydro-

- 4 *Oatmeal and soda* Boil 2 cups of bulk oatmeal in 1 qt. of water in a double boiler for 30-45 minutes. Or cook 2 cups of quick cooking oatmeal in 1 qt. of water for 1 minute. Allow to cool for 15 minutes. Add $\frac{1}{2}$ cup baking soda (NaHCO_3). Pour entire mixture into a gauze bag and tie shut. The patient should express the oatmeal mash through the gauze, applying it over the body. The mash should be thoroughly washed off before leaving the tub.
- 5 *Cornstarch* Three types of cornstarch are available (1) edible starch, representing raw cornstarch in a powdered form, (2) gloss starch, a raw cornstarch in lump form, and (3) Linit, a modified starch, made by subjecting the starch to a mild acid treatment followed by neutralization washings and filtration. The product contains approximately 1% boric acid, which is added before drying of the starch. Linit is not "preboiled" and has undergone little hydrolytic degradation of the starch molecule, nevertheless, the physical properties have been changed so that it produces solutions of less viscosity than native cornstarch. Mix 2 cups of starch, preferably Linit, with 4 cups of tap water to form paste. Add mixture to tub while stirring.
- 6 *Starch and soda* Mix 2 cups of cornstarch and 1 cup of baking soda in a basin of cold water. Add mixture to tub bath.

Bath Oil

Some believe that addition of oil to the bath water may help prevent drying of dry skin. However, others believe that it is not possible to wash and lubricate the skin simultaneously, that it is necessary first to wash and then to apply a lubricating preparation.

- 1 *Lubath* (Texas Pharmacal) consists of cottonseed oil made dispersible by incorporation of a nonionic wetting agent, Triton X-45.
Available in 8 oz. bottles
- 2 *Alpha-Keri* (Westwood) consists of a dewaxed oil soluble lanolin fraction in combination with mineral oil.
Available in 8 oz. bottles

- 3 *Gen Bath* (Dermik) is a mixture of vegetable oils having a low index of unsaturation with an emulsifying agent.
Available in 6 oz bottles

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Potassium Permanganate (KMnO_4) Baths

A potassium permanganate bath is used in infected and weeping dermatoses and bullous eruptions, such as pemphigus. Potassium permanganate is germicidal, drying and deodorizing because of its oxidizing properties. The requisite amount of potassium permanganate, either crystals or crushed tablets, should be dissolved in 1 qt of water, which should then be added to the tub. The patient should get into the bath immediately so that his skin can benefit from the oxidizing properties of the potassium permanganate.

For a 1:10,000 dilution, use twenty-five 0.3 Gm (5 gr) tablets or 2 tsp of crystals. For a 1:20,000 dilution, use twelve 0.3 Gm (5 gr) tablets or 1 tsp of crystals. When tablets are used they must be finely pulverized between 2 wooden tongue blades.

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- 1 *Lubath* (Texas Pharmacal) consists of cottonseed oil made dispersible by incorporation of a nonionic wetting agent, Triton X-45.
Available in 11 oz. bottles
- 2 *Alpha Ker* (Westwood) consists of a dewaxed oil soluble lanolin fraction in combination with mineral oil.
Available in 8 oz. bottles

dermatitis, etc., to prolong life in otherwise fatal cases of disseminated lupus erythematosus, pemphigus etc. For acute anaphylactic reactions intravenous administration of steroids is not as effective as subcutaneous or intramuscular injection of epinephrine, which is the drug of choice, or intramuscular injection of antihistamines.

is the active agent. The prednisolone and fluorinated derivatives are metabolized at a slower rate than cortisone and hydrocortisone. This may be one reason why smaller quantities are required to attain a therapeutic effect. A comparison of the effects of steroids and antihistamines on different types of allergic reactions is given in the table.

REACTION TYPE	STEROIDS	ANTIHISTAMINES
Anaphylaxis	† or 0	†
Immediate type skin tests	0	†
Delayed type skin tests	†	0
Vascular lesions of serum sickness type	†	0
Allergic encephalomyelitis	†	0
Antibody formation	† or 0	0
Atopic reactions	†	† or 0

† = Inhibition of reaction

0 = No effect on reaction

A question often asked is whether the various steroids affect the same diseases in the same way or whether certain steroids affect one disease more than another. It is likely that some specificity is involved although much more research is needed.

steroid triamcinolone, benefit psoriasis many steroids do not.

Dose Before instituting steroid therapy, the physician must know the general medical status of the patient. He must rule out by history and/or laboratory examination hypertension, diabetes, peptic ulcer, psychosis and systemic infection, such as tuberculosis etc. If one or more of these diseases is present, the decision as to the use of steroids and the dose will depend on the severity of that disease and the possibility of controlling it. For example, if mild diabetes mellitus is present, which

cortisone, prednisone, prednisolone, fluorohydrocortisone (fludrocortisone), methylprednisolone, triamcinolone, triamcinolone acetate, dexamethasone, fluorometholone and 6 fluoroprednisolone. Six of these 11 steroids contain fluorine. Some steroids are active topically while others are not.

SYSTEMIC ADMINISTRATION OF STEROIDS

On a weight basis, cortisone is the least potent of the steroids. If cortisone is taken as a reference standard with regard to dermatologic effectiveness, then the amount of hydrocortisone required to produce the same effect would be 0.8 the cortisone dose, prednisone and prednisolone 0.4, methylprednisolone and triamcinolone 0.32, 6 fluoroprednisolone 0.16 and dexamethasone 0.08. These ratios do not apply to nondermatologic disorders such as Addison's disease, arthritis, blood dyscrasias, etc. If 100 mg of cortisone is required to produce a favorable therapeutic response, the dose requirements of the other steroids would be

Cortisone	100 mg
Hydrocortisone	80
Prednisone and prednisolone	40
Methylprednisolone and triamcinolone	32
6 Fluoroprednisolone	16
Dexamethasone	8

Triamcinolone acetate, fluorometholone and fluorohydrocortisone are used topically but not orally. Both triamcinolone acetate and fluorometholone are active orally at a dose level comparable to that of prednisolone. However, topically they are potent anti-inflammatory agents and are effective in small concentrations. For this reason these drugs are sold only for topical application. As an anti-inflammatory agent, fluorohydrocortisone is approximately 10 times as potent as hydrocortisone. However, its salt retaining effects are 50 times greater, consequently, it is not used systemically for dermatologic disease.

Indication Steroids are used to shorten acute, self limited dermatoses, such as severe contact dermatitis, drug reactions, urticaria and other sudden tissue responses, to control acute exacerbations of chronic disorders such as atopic dermatitis, seborrheic

while to give 100 units ACTH gel daily in addition to maintaining the oral steroid dose. The clinical impression exists that ACTH preparations have a direct tropic action on the skin in addition to stimulating the production of hydrocortisone by the adrenal gland. In patients on high doses of steroids by mouth the hydrocortisone output by the adrenal gland probably is nil and this situation is not changed by the administration of ACTH. However the direct action of ACTH on the skin may be responsible for the beneficial effect. The purified ACTH available commercially contains about 10% ACTH and 90% other materials from the pituitary gland. It is not known whether the good effects stem from the ACTH or from one of the other agents present.

Side effects. A sense of well being is frequently noted by patients under treatment with steroids. During prolonged therapy, the patient should be observed at regular intervals because complications may occur such as gastrointestinal ulceration, hypertension, masking of an intercurrent infection, diabetes and thrombophlebitis. Acne, moon facies, hirsutism and ecchymoses

10

2,3

1 2 3 4

administration of triamcinolone, methylprednisolone and dexamethasone. These three steroids sometimes produce weight loss. Sodium retention and potassium depletion occur with administration of cortisone, hydrocortisone, prednisone and prednisolone. To prevent edema, sodium should be restricted in patients receiving high doses and/or prolonged therapy.

1 2 3 4 5 6

with triamcinolone and dexamethasone.

To aid in the prevention of osteoporosis, the patient on steroids should be active physically and not confined to bed for long. Androgens are of questionable value.

Withdrawal reactions. While the steroid dose is being reduced, withdrawal reactions are apt to occur. These are of 2 types:

heretofore was controlled by diet, it is possible that administration of Orinase or a small amount of insulin will permit treatment with steroids

For an acute, self-limited process, such as contact dermatitis or drug reaction, the average adult dose, using prednisolone as a reference, is 60 mg in divided doses daily for 2 or 3 days. Then the dose should be decreased by 5 mg a day until zero.

For an acute exacerbation of a chronic disorder, such as atopic dermatitis, severe nummular eczema, etc., the average adult dose, using prednisolone as a reference, is 40 mg in divided doses daily for 2 or 3 days. After that point the dose is reduced slowly by 5 mg a day. If a flare up occurs while the dose is being decreased, the patient should be maintained on the minimum effective dose. Many of these patients have to be kept on 5-15 mg daily for several weeks.

For severe diseases of acute onset, such as lupus erythematosus and pemphigus, the adult dose, using prednisolone as a reference, varies from 60 to 120 mg in divided doses daily until a satisfactory therapeutic response is obtained. The dose then should be decreased gradually by 5-10 mg daily until the minimum effective dose is reached. This level should be the maintenance dose for several days or weeks. If the patient is asymptomatic, the dose may be lowered again.

TOTAL DAILY DOSE (IN MG)

TO BE GIVEN ORALLY IN DIVIDED PORTIONS 2 TO 4 TIMES DAILY

	ADULTS	CHILDREN
Cortisone	25-300	10-100
Hydrocortisone	20-240	10-80
Prednisone	10-120	5-50
Prednisolone	10-120	5-50
Methylprednisolone	8-60	4-32
Triamcinolone	8-60	4-32
6-Fluoroprednisolone	4-30	2-16
Dexamethasone	1.5-15	0.75-7.5

Some patients will be maintained on very small amounts of these drugs, e.g., 5-15 mg prednisone or prednisolone, 4-8 mg methylprednisolone or triamcinolone or 1.5-3 mg dexamethasone.

When patients with an acute, severe illness such as pemphigus or lupus erythematosus, are receiving 60-120 mg of prednisolone daily without showing an adequate response, it is often worth

stimulating the production of hydrocortisone by the adrenal gland. In patients on high doses of steroids by mouth, the hydrocortisone output by the adrenal gland probably is nil, and this situation is not changed by the administration of ACTH. However, the direct action of ACTH on the skin may be responsible for the beneficial effect. The purified ACTH available commercially contains about 10% ACTH and 90% other materials from the pituitary gland. It is not known whether the good effects stem from the ACTH or from one of the other agents present.

Side effects. A sense of well being is frequently noted by patients under treatment with steroids. During prolonged therapy, the patient should be observed at regular intervals because complications may occur, such as gastrointestinal ulceration, hypertension, masking of an intercurrent infection, diabetes and thrombophlebitis. Acne, moon facies, hirsutism and ecchymoses may develop, but these usually cease on withdrawal of the drug.

The following examinations should be carried out periodically: blood pressure, weight, urinalysis, white blood cell count. The diet should be high in protein to help maintain body stores of calcium and to counteract protein loss associated with administration of triamcinolone, methylprednisolone and dexamethasone. These three steroids sometimes produce weight loss. Sodium retention and potassium depletion occur with administration of cortisone, hydrocortisone, prednisone and prednisolone. To prevent edema, sodium should be restricted in patients receiving high doses and/or prolonged therapy with these steroids. Supplemental potassium may be given in a dose of 2 Gm. twice daily for adults or 0.5 Gm. 3 times daily for children. Excretion of both sodium and potassium occurs with triamcinolone and dexamethasone.

To aid in the prevention of osteoporosis, the patient on steroids should be active physically and not confined to bed for long.

Withdrawal.
withdraw

cutaneous and systemic. The former usually represent a flare up of the original dermatitis and are common when steroids are used to treat patients with chronic skin disease. For these patients the steroid dose should be increased a little above that being used at the time the dermatitis began to recur. After 7 to 10 days the steroid dose may be lowered gradually again with the aim of decreasing it to zero.

Systemic withdrawal reactions usually are not associated with any exacerbation of cutaneous lesions. These reactions include feelings of anxiety, increased nervous tension, polyarthritus, vague aches and pains. For these reactions the steroid dose must be increased, as is done in the case of cutaneous withdrawal reactions, or the patient may be given ACTH. Usually the following regimen will suffice: 20-40 units of ACTH gel intramuscularly twice a week for one week, then 10-20 units twice a week the second week and finally 5-10 units twice weekly the last week.

Available. The following chart summarizes the steroids for systemic use and their tablet sizes for oral administration. Cortisone, hydrocortisone and prednisolone also are prepared for intramuscular injection. Water-soluble derivatives of hydrocortisone and prednisolone can be given intravenously for emergency situations.

Cortisone (11-dehydro-17-hydroxycorticosterone, compound E)
5, 10, 25 mg tablets

Hydrocortisone (17-hydroxycorticosterone, compound F, cortisol)
Cortef (Upjohn), Hydrocortone (Merck)
5, 10, 20 mg tablets

Prednisone (delta-1 dehydrocortisone)
Deltasone (Upjohn), Deltra (Merck), Metcorten (Schering)
1, 2.5, 5 mg tablets

Prednisolone (delta-1-dehydrohydrocortisone)
Delta-Cortel (Upjohn), Hydeltira (Merck), Metcortelone (Schering), Sterane (Pfizer)
1, 2.5, 5 mg tablets

Methylprednisolone (6 α -methylprednisolone)
Medrol (Upjohn)
2, 4 mg tablets

Triamcinolone (9 α fluoro-16 α -hydrocyprednisolone)

Aristocort (Lederle), Kenacort (Squibb)

1, 2, 4 mg tablets

Dexamethasone (9 α -fluoro-16 α methylprednisolone)

Decadron (Merck), Deronil (Schering), Gammacorten (Ciba)

0.5, 0.75 mg tablets

Alphadrol (6 α fluoroprednisolone)

Not yet commercially available

TOPICAL STEROIDS

Hydrocortisone and its derivatives in lotions, creams and ointments are important in the treatment of eczematous eruptions

effect topically. These agents have all but replaced the old standbys, such as calamine and other shake lotions.

The steroids have almost a specific effect in controlling and alleviating pruritus and in correcting the abnormal keratinizing reactions that occur with pruritus. Topical steroids have no effect on the abnormal keratinization of psoriasis, but they often relieve the pruritus that sometimes accompanies this disease.

Steroids for topical use are available in many forms and concentrations. When secondary bacterial infection is a problem, it is advisable to use the preparations containing antibiotics. However for general use as an antipruritic, it is best not to use such preparations. The application of lotions and ointments with antibiotics but without antifungal agents to body folds and creases, such as the axillary, inguinal and anal areas, encourages the development of candidiasis.

Many physicians are concerned about the possibility of absorbing topically applied steroids in sufficient quantities to produce systemic changes. From a practical standpoint this is of significance only in the case of cortisone when

Absorption of topically applied fluorohydrocortisone can lead to

salt retention. However, with the other steroids there is no problem. On normal, intact skin a maximum of 3% of applied hydrocortisone is absorbed into the systemic circulation by trans follicular and transepidermal routes. This means that 700 mg of hydrocortisone or 70 ml of 1% hydrocortisone lotion would have to be applied for 20 mg of the compound to be absorbed. Because of cost, and because small quantities usually are effective, one does not apply 70 ml of hydrocortisone daily. If one did absorption of 20 mg of hydrocortisone for short periods would not be particularly harmful. Through damaged skin, absorption would be much greater than 3%. However, the application of steroids usually brings about rapid healing of denuded surfaces resulting from eczematous eruptions so that systemic absorption decreases rapidly. Through mucous membranes which normally lack the superficial barrier of skin, absorption is about 27%. In skin stripped of its outer layers following repeated application of scotch tape, approximately 85% of hydrocortisone is absorbed.

Triamcinolone acetonide and fluorometholone are ideally suited for topical application because they are potent local anti-inflammatory agents and yet have little effect when administered systemically. Therefore, it makes no difference whether or not their topical application results in systemic absorption.

There are surprisingly few complications and contraindications to the use of steroids. They are not used in the presence of active cutaneous infection unless combined with antibiotics. They are contraindicated in recurrent herpes simplex involving the eye. On rare occasions a bacterial cellulitis or pustular eruption may follow application of topical steroids. It has been our impression that topical and oral steroids given to patients with atopic dermatitis predisposed them to the development of a generalized herpes simplex infection. This observation has not led us to restrict the use of topical steroids in atopic dermatitis, but it is a point to keep in mind when an acute eruption develops in a patient with atopic dermatitis.

Application. Steroids usually are available in at least 2 strengths in lotions, creams and ointments with or without antibacterial and antifungal agents. Hydrocortisone free alcohol and hydrocortisone acetate are of equal effectiveness. In general we

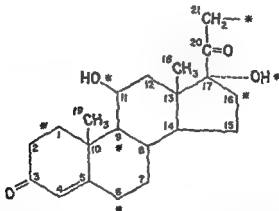
RELATIVE BIOLOGIC POTENCIES PER WEIGHT OF STEROID
(Hydrocortisone is given a reference value of 1)

	Dermatologic Effectiveness		SALT RETENTION AND EDEMA	MOON FACIES AND ACNE	WEIGHT GAIN	OSTEO- POROSIS
	Systemic	Topical				
Cortisone	0.8	0	0.8	0.8	0.8	0.8
Hydrocortisone	1	1	1	1	1	1
Prednisone	2	0	1	1	2	2
Prednisolone	2	2	1	2	2	2
Methylprednisolone	3	4	0	3	0	3
Triamcinolone	3	4	Na excretion	4	wt loss	3
6-Fluoroprednisolone	6	7	0	*	*	*
Dexamethasone	10	10	Na excretion	*	marked	*
Fluorohydrocortisone	3	10	50	*	*	*
Triamcinolone acetonide	2	100	Na excretion	*	*	*
Fluorometholone		40	0	*	*	*

* Not known

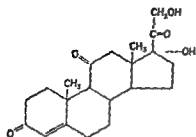
However, for practical purposes there seems to be no difference in effectiveness between the water- and the alcohol soluble hydrocortisone and prednisolone. The hydrocortisone products are best used in 1% strength and the prednisolone products in 0.5% strength.

The steroids also are available in combination with tar for the treatment of eczematous eruptions, with antihistamines for the treatment of pruritus and with sulfur resorcin compounds for treatment of the inflammatory aspects of acne. Unfortunately, none of these products has been evaluated critically. Topical antihistamines usually are not recommended because of sensitizing properties.

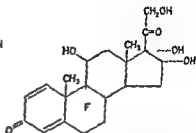


Nucleus and Numbering System Common to the Corticosteroids

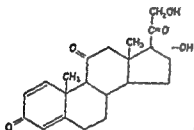
The steroids available at this time are modifications of the above nucleus at one or more of the seven places indicated by asterisks.



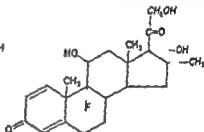
Cortisone



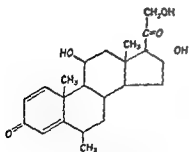
Triamcinolone
(Aristocort, Kenacort)



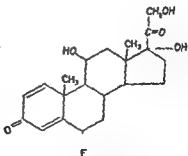
Prednisone
(Deltasone, Delta, Metacorten)



Dexamethasone
(Decadron, Deronil, Gamma-corten)

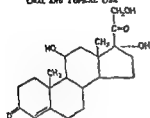


6-Methylprednisolone
(Medrol)



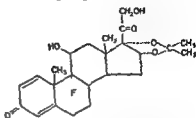
6-Fluoroprednisolone
(Alphadrol)

ORAL AND TOPICAL USE

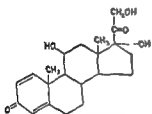


Hydrocortisone
(Cortef, Hydrocortone)

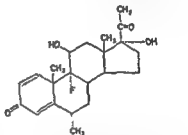
TOPICAL USE ONLY



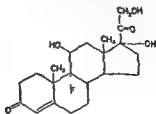
Triamcinolone acetonide
(Kenalog, Aristocort acetonide)



Prednisolone
(Delta Cortef, Hydeltara,
Meticortolone, Sterane)

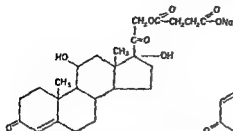


Fluorometholone
(9d-Fluoro-21-deoxy-Medrol,
Oxylone)

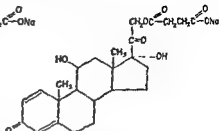


Fluorohydrocortisone
(Florinef)

WATER SOLUBLE STEROIDS
FOR INTRAVENOUS OR INTRAMUSCULAR USE

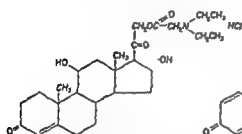


Sodium succinate ester of hydrocortisone (Solu Cortef)
 For IV or IM use

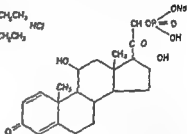


Sodium succinate ester of prednisolone
 (Meticortelone soluble)
 For IV or IM use

WATER SOLUBLE STEROIDS
FOR TOPICAL USE IN 0.5% CONCENTRATION



Hydrocortisone diethylamino-
 acetate hydrochloride
 (MagnaCort)
 For topical use in 0.5%
 concentration



Prednisolone 21 phosphate
 monosodium salt
 (Hydeltrasol)
 For topical use in 0.5%
 concentration

ACTH

ACTH or adrenocorticotrophic hormone usually is prepared from porcine pituitary glands for parenteral administration. In Europe at least one company uses ACTH obtained from whale pituitary glands.

Structure ACTH (corticotropin, β -corticotropin or corticotropin-A) from the pituitary glands of hogs, sheep, cows and human beings is a linear polypeptide consisting of 39 amino acids. The amino acid sequences in several places of the pep-

C-terminal amino acid has an amide group. Two porcine β -MSH's consist of 18 amino acids, 7 of which have a sequence common to α -MSH and ACTH. The structures of porcine ACTH and α -MSH are given here for comparison.

Indication See the discussion under Systemic Administration of Steroids.

Mechanism of Action High potency, commercially available ACTH contains approximately 10% ACTH and 90% other polypeptides. It is possible that some of the effects obtained clinically result from the non-ACTH polypeptides present. It

On a cellular level, only 2 functions of porcine ACTH are known. (1) ACTH stimulates the accumulation of cyclic adenine nucleotide which in turn activates the enzyme phosphorylase. The phosphorylase enzymes, which are widely distributed in tissues, catalyze reversibly the phosphorylytic splitting of α -glucoside linkages of the polysaccharides, glycogen and starch to α -glucose-1-phosphate, which can be metabolized further. Thus action of ACTH on adrenal phosphorylase appears to be similar to the mechanism by which glucagon and epinephrine activate phosphorylase in the liver. (2) ACTH causes darkening of melanocytes in frog skin by bringing about a reversible dispersion of pigment granules in the cytoplasm of the cells.

Dose The usual dose ranges from 20 to 100 units daily. For prolonged action of 12-24 hours, ACTH is given intramuscularly in a gelatin vehicle or as a zinc complex. ACTH in solution is given intravenously. 1 unit of ACTH gel intramuscularly is approximately equivalent in anti-inflammatory effect to 1 mg of prednisolone. ACTH also may be used when patients receiving high doses of steroids do not achieve the expected therapeutic effect.

Available as ACTH or corticotropin in vials

Gel (Armour, National, Organon, Upjohn, Wilson) for intramuscular use 20, 40, 80 μ /ml

Zinc corticotropin (Organon) for intramuscular use 40 μ /ml

Solution (Armour, National, Wilson) for intravenous use
10, 20, 40 μ /ml

Lyophilized powder (Armour, Upjohn) to be made up for
intravenous use 10, 25, 40 μ /vial

Side effects See the discussion on steroid therapy Available
ACTH preparations contain a significant quantity of melanocyte stimulating hormones, α - and β -MSH On prolonged administration hyperpigmentation may occur

Sweating Disorders

THE CHIEF DISORDERS OF SWEATING can be divided into 2 types

(1) hyperhidrosis, an abnormal increase in sweat production,
(2) anhidrosis, an abnormal decrease in production and/or
delivery of sweat. The commonest dermatologic manifestation of
anhidrosis is the sweat retention syndrome (miliaria, heat rash),
a result of poral obstruction which prevents sweat from reaching
the skin surface

HYPERHIDROSIS

Systemic and topical agents can be used for treatment of
localized hyperhidrosis Systemic medication includes anticholinergic
drugs, sedatives and tranquilizers. The side effects of these
compounds detract from their usefulness

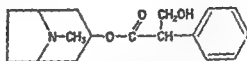
SYSTEMIC AGENTS

The anticholinergic drugs, e.g., atropine, Banthine, Pro-Banthine and Pamine prevent the action of acetylcholine on the
effector organs of postganglionic cholinergic nerves Hence, the
nerves to the sweat glands, which are anatomically sympathetic
but functionally cholinergic, are blocked. Banthine, unlike atropine,
also blocks the autonomic ganglia of the sympathetic and
parasympathetic nervous system The action of Pro-Banthine is
similar to that of Banthine, but it is 1 to 5 times more potent in

its atropine like effects and about $1\frac{1}{2}$ times as potent as a gangliolytic agent. Also, clinically effective doses cause fewer side reactions. All these anticholinergic drugs produce side effects such as dryness of mucous membranes, mydriasis, blurred vision, abdominal distress, urinary retention and decreased libido.

These drugs are contraindicated in the presence of glaucoma, prostatic hypertrophy or cardiac failure.

Belladonna Tincture, U S P

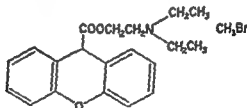


Atropine
(DL hyoscyamine)

Belladonna tincture is prepared from belladonna leaf or herb, *Atropa belladonna* L. The chief alkaloid in belladonna is L-hyoscyamine, with lesser amounts of L-scopolamine (hyoscine) and possibly some atropine, which is DL-hyoscyamine, also present. Atropine may be prepared from L-hyoscyamine or synthesized.

Dose 6-10 drops orally 3 times daily

Banthine Bromide (Searle)



Banthine bromide
(β Diethylaminoethyl xanthene 9 carboxylate methylbromide, methantheline)

Dose 50-100 mg orally 3 to 4 times daily

Available in 50 mg tablets

Pro-Banthine Bromide (Searle)

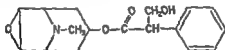
Pro-Banthine (propantheline) is similar to Banthine but has 2 isopropyl groups instead of 2 ethyl groups on the nitrogen atom.

Dose 15 mg orally 3 times daily

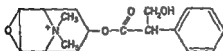
Available in 15 mg tablets which are comparable to 50 mg of Banthine.

Pamine Bromide (Upjohn)

Pamine bromide is the N methylbromide (quaternary ammonium derivative) of scopolamine



Scopolamine



Br

Pamine bromide

(Epoxytropine tropate methylbromide scopolamine methylbromide)

Dose 25 mg orally 4 times daily

Available in 25 mg tablets with or without 15 mg phenobarbital

Sedatives and Tranquilizers

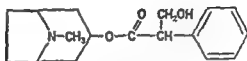
Hyperhidrosis of emotional origin is sometimes reduced through the use of sedatives or tranquilizers. The following are some examples of drugs which can be taken orally 3 to 4 times daily

Phenobarbital	15 mg
Benadryl	50-100 mg
Chlorpromazine	25-50 mg
Reserpine	0.25 mg.

its atropine like effects and about $1\frac{1}{2}$ times as potent as a gangliolytic agent. Also, clinically effective doses cause fewer side reactions. All these anticholinergic drugs produce side effects such as dryness of mucous membranes, mydriasis, blurred vision, abdominal distress, urinary retention and decreased libido.

These drugs are contraindicated in the presence of glaucoma, prostatic hypertrophy or cardiac failure.

Belladonna Tincture, U S P

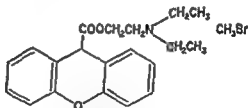


Atropine
(DL-hyoscyamine)

Belladonna tincture is prepared from belladonna leaf or herb *Atropa belladonna* L. The chief alkaloid in belladonna is L-hyoscyamine, with lesser amounts of L-scopolamine (hyoscyne) and possibly some atropine, which is DL-hyoscyamine, also present. Atropine may be prepared from L-hyoscyamine or synthesized.

Dose: 6-10 drops orally 3 times daily.

Banthine Bromide (Searle)



Banthine bromide
(β -Diethylaminoethyl xanthene 9-carboxylate methylbromide
methantheline)

Dose: 50-100 mg orally 3 to 4 times daily.

Available in 50 mg tablets.

Tannic Acid Lotion

Tannic acid 5%
In 70% ethyl alcohol

A variety of tannic acids is found in nature. Chemically, these acids are polymers of various hydroxybenzoic acids. The acid commonly referred to as tannic acid is gallotannic acid, the internal ester of gallic acid. It is usually obtained from nutgall, an excrescence on the young twigs of various species of oak trees.

Indication Hyperhidrosis of feet

Mode of action Unknown

Application Apply to feet morning and night as required

Available on prescription.

Formalin, 0.25-0.5 strength

Formaldehyde (HCHO), which is a gas at room temperature, is used in the form of aqueous solutions. Formalin is formaldehyde solution U.S.P., which contains 37% formaldehyde by weight with methyl alcohol added to prevent polymerization and inactivation.

Indication " " " " " " " "

Mode of act " " " " " " " "

it The " " " " " " " "

Application Apply to palms and soles. Sweating may be reduced for a period of 1 to 20 days.

Caution Formaldehyde may act as a primary irritant or as a sensitizing agent.

Available on prescription.

Foot Soaks**Aqueous**

Soaking the feet in plain water for an hour or more may inhibit sweating for 8 hours, probably because the terminal sweat ducts become occluded by the swollen cells of the stratum corneum.

Astringent

Astringents are drugs used locally which precipitate proteins

TOPICAL AGENTS

Aluminum Lotion

Aluminum chloride (AlCl_3) 10-25%
In distilled water

Indication Axillary hyperhidrosis and for prevention of odor. Aluminum salts are more effective as deodorants than are antiperspirants.

Mode of action Aluminum chloride, which acts as a mild epidermal irritant, produces anhidrosis by plugging the orifices of the sweat ducts so that sweat cannot escape onto the skin surface. This effect does not occur in the majority of patients. Aluminum compounds also decrease axillary odor associated with sweating. Sterile sweat from apocrine and eccrine glands has no odor, but reaction with bacteria on the skin results in an unpleasant odor. Aluminum salts have an antibacterial effect which prevents development of odor. In addition they produce a chemical change which makes the usual products of bacterial decomposition in offensive.

Axillary odor also can be abolished by shaving and daily washing with ordinary or antibacterial soap.

Application In severe hyperhidrosis the sweat washes away the astringent, so it is helpful to apply this preparation at night because emotional sweating is reduced during sleep. Apply with cotton to involved areas before bedtime, allowing solution to dry for one minute. Immediately thereafter, dust area with talcum powder. It is advisable to begin with a 10% solution, gradually increasing it to 25% if tolerated.

Caution Axillary miliaria, or the sweat retention syndrome, may develop in susceptible persons. In high concentration, aluminum chloride may stain clothing which comes in contact with it.

Available on prescription

- Indication* Hyperhidrosis of nonirritated feet. This powder is stronger than the preceding one
- Application* Dust onto feet each morning
- Available on* prescription

SWEAT RETENTION SYNDROME

rubra) is the commonest form. The most significant factor in treatment is reduction of the need for sweating. This can be brought about through proper ventilation and avoidance of exposure to heat. The following medications have been used as adjuncts to this therapy.

Ointments and Lotions

Ointment bases, e.g., Eucerine and water in-oil emulsions, with or without hydrocortisone may be helpful.

Mode of action In the presence of excessive sweating or following application of organic solvents the keratin rings surrounding the orifices of the sweat ducts become closed. Plugging of the sweat ducts leads to the formation of erythematous papules, vesicles or vesicopustules. This sequence of events may be reversed by applying lipid substances to the skin, for lipids are required to keep the keratin rings patent. Shortly after the application of a lipid to an anhidrotic area the sweat may be seen to come from the duct orifice. The keratin rings, which are not as resistant to alkali as acid, are not as resistant to alkali as acid.

The inflammatory reaction in miliaria frequently can be controlled by topical hydrocortisone.

Powders

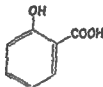
Dusting powders may offer symptomatic relief.

but are so weakly penetrable that only the surface of cells is affected. Consequently, the permeability of the cell membrane is greatly reduced, but the cell itself remains viable. The following astringents when used as soaks have a more prolonged effect on sweat inhibition than plain water.

- 1 Burow's soaks (1:40)
- 2 Potassium permanganate (1:2,000)
- 3 Tannic acid (2% in alcohol)

Powder

1 Aluminum chloride	3%
Salicylic acid	3%
Alum	10%
Talcum powder	84%



Salicylic acid

AlCl_3
 Aluminum chloride
 $\text{Al}_2(\text{SO}_4)_3 \cdot 12\text{H}_2\text{O}$
 Alum
 (Aluminum potassium sulfate)
 Salicylic acid
 $\text{Mg}_3\text{Si}_2\text{O}_8$
 Talc
 (Magnesium silicate)

Indication · Hyperhidrosis and bromhidrosis of feet

Application Dust onto involved areas 1 to 3 times daily

Available on prescription

- 2 Tannic acid powder
- Boric acid powder
- Zinc oxide
- Equal parts of each

H_3BO_3
Boric acid

ZnO
Zinc Oxide

Mode of action The mechanism through which tars act on abnormal skin is, unfortunately, not known. Clinically, it can be observed that tars correct abnormalities in keratinization by decreasing epidermal proliferation and dermal infiltration

from exposure to radiant energy. In the shale tars, some of the organic sulfur compounds may be the active chemicals. Tars also have vasoconstricting, astringent and antipruritic properties. Some but not all of the antipruritic effect is probably due to the phenols present. As a rule, tars exert a greater therapeutic effect if the lesions are irradiated with ultraviolet light after application of the tar. Similar results are then applying

the tar before light exposure. However, when tar itself is irradiated, the new compounds formed either are unstable or else cannot penetrate the skin. It is possible that some of the orthoquinones and peroxides formed from the tars in irradiated skin inactivate epidermal sulfhydryl groups and thus produce a beneficial effect similar to, but greater than, unirradiated tar.

Caution Prolonged use of some tars is associated with the production of folliculitis. If folliculitis occurs, topical antibiotics should be applied. Because tars tend to produce photosensitization, they should not be used in such disorders as lupus erythematosus, polymorphous light eruptions, etc. Urinalyses should be done when tar is being applied to large areas because occasionally absorption can cause renal damage. Absorption of large amounts of tar can cause gastrointestinal irritation.

COAL TAR

Coal tar (*pix carbonis*) is obtained usually as a by-product during the destructive distillation of coal. Its constituents are benzene, toluene, naphthalene, anthracene, xylene and other aromatic hydrocarbons, phenol, cresol and other phenolic bodies,

Tar Preparations

TARS ARE DARK COLORED LIQUIDS containing mixtures of hydrocarbons and aromatic compounds obtained through destructive distillation of vegetable matter. Numerous tar preparations are available, none of which can be clearly delineated because their chemical composition is not known. Even tars obtained from the same source may differ from one another if prepared by different methods. The term *crude coal tar* itself is not a definitive one, for although some commercial coal tars used in dermatology are prepared from anthracite coal, most of the coal tars in the eastern part of the United States are obtained from bituminous coal. And on the west coast, so called crude coal tar comes from the oils derived from natural gas. Add to this variability in source the fact that these tars are distilled at different temperatures and one is left with products which are highly dissimilar. Tars for dermatologic use also are obtained from shales or schists, wood and petroleum.

Indication Topical steroids to a great extent have replaced tar in the treatment of eczematous eruptions and pruritus. However, tar is still useful for these disorders and is often the treatment of choice for psoriasis. At present the coal tars are most widely used in dermatology. Of the shale tars, ichthammol is very effective, being used when a tar milder than that derived from coal is indicated. Wood tars, chiefly pine and juniper, are used by some. Tars may be incorporated in lotions, ointments, pastes, shampoos, soaps, baths or used undiluted as varnishes. The concentration of the tar prescribed must vary not only with the disorder being treated but also in accordance with the type of vehicle in which it is incorporated. For example, 5% crude coal tar in petrolatum is comparable to 2% crude coal tar in a penetrating O/W or W/O base. The effectiveness of tar is often increased when it is used in conjunction with ultraviolet light.

Liquor Carbonis Detergens, N F

Crude coal tar	200 ml
Quillaja	100 ml
95% ethyl alcohol	700 ml.

Allow to stand and filter Dilute filtrate to 1,000 ml with 95% ethyl alcohol

Quillaja is a foaming agent It is also known as soap bark, Panama bark, China bark or Murillo bark, which is the dried inner bark of *Quillaja saponaria* Molina and contains quillaic acid, quillajasaponin, sucrose, tannin and other chemicals The word 'quillaja' is derived from the Chilean *quilean*, which means to wash

For antipruritic tar baths, 15-30 ml of liquor carbonis detergens may be added to the tub In shampoos, 5-10% of the tar may be added It is also incorporated in lotions, ointments, etc.

Wright's Liquor Carbonis Detergens (Fougera)

Alcoholic extract of a coal tar from England	12.8%
95% ethyl alcohol	87.2%

Available in 3, 8, 16 oz bottles and in 2 oz aerosol spray

BITUMINOUS SHALES OR SCHISTS

Shales are fissile rocks formed by the consolidation of clay, mud or silt and have a finely stratified or laminated structure The term *schist* is applied to any metamorphic crystalline rock having a foliated structure which can be split readily into slabs

Ichthammol is a dark brown viscid liquid obtained from the destructive distillation of certain bituminous shales or schists rich in the oily residue left from fossil fish It is sulfonated with sulfuric acid and neutralized with ammonia Ichthammol contains approximately 25% ammonia, 8% ammonium sulfate, 10% sulfur, inorganic compounds, as well as several hydrocarbons and aromatic substances Ichthammol is the mildest acting of the tar preparations and the only one which is water soluble It is usually too mild for use in severe but it is useful in inflammatory and eczematous preparations available in 2-5% concentration in zinc oxide paste

ammonia, pyridine and some other organic bases. Coal tar is only slightly soluble in water. Approximately 3% of the coal which is heated is converted to coal tar. When crude coal tar is ordered without further specification in the eastern part of the United States, the product is prepared from bituminous (soft) coal. When crude coal tar is ordered on the west coast, it comes from the oils of natural gas. Some commercial dermatologic tars are derived from anthracite (hard) coal.

Zetar (Dermik)

Zetar is a standardized commercial product obtained from a particular type of anthracite coal which has undergone destructive distillation at 700–800° C and which is irradiated with ultraviolet light. The product is specially processed with a small quantity of a surface active agent to make it easily washable with water.

Zetar is available full strength for incorporation in a vehicle of one's choice. It is also prepared as a 2% ointment or lotion, as a 50% emulsion for tar baths and as a 1% superfatted shampoo.

Kolpik A and Kolpik D (Dome)

These preparations contain the following ingredients

Coal tar A or D	2%
Zinc oxide	5%
Starch	25%
Washable base	68%

The tars A and D are obtained from bituminous coal destructively distilled at high temperatures (1,000–1,300° C). Tar A is a crude coke oven fraction and tar D a crude vertical retort fraction. Each tar is derived from a different source. The manufacturers claim that Kolpik A is of value in wet eczemas and Kolpik D in dry squamous eczemas.

Crude Coal Tar, N F

A variety of tars is commercially available. They are obtained from different sources and prepared by different methods but conform to requirements set forth in the National Formulary.

of *Pinus palustris* Miller or of other species of *Pinus*. It contains turpentine, resin, guaiacol, creosol, methylcreosol, phenol, phlorol, toluene, xylene and other hydrocarbons. Pine tars are used in ointments in a strength of 1-5%.

Pine Tar, N. F.

PETROLEUM OR COAL OIL

Although petroleum tars are not in common use today, the derivative most widely used in the past was naphthalan, obtained from Caucasian crude petroleum benzine.

Ultraviolet Light

ULTRAVIOLET LIGHT IRRADIATION is often used in treatment of acne vulgaris, psoriasis, chronic eczematous eruptions, vitiligo and other skin disorders. A sun bulb lamp for example, RS-Westinghouse or General Electric RS, costs about \$10 and can be screwed into an ordinary light socket such as that of a goose neck lamp. Lamps with quartz tubes can be purchased for from \$50 to \$150 for home use. Either type of radiation source, when properly used, produces beneficial results. Different procedures are suggested in using the 2 types because the sun lamp is much weaker than the quartz tube, and longer exposure times are required.

Whenever exposed to ultraviolet light, the patient must protect his eyes with special sun goggles, not ordinary sun glasses, or with moist cotton placed over the eyes. Ultraviolet light may be given every day or every other day. If a sunburn develops, discontinue treatment until the reaction has subsided. Resume treatment at half the previous exposure time.

Irradiation of the entire body surface: Undress completely and lie down. Place lamp so that lower edge of light source is exactly 30 in. from the navel or the middle of the back.

Ichthyol (Schering)

This product, obtained from shale deposits in the Seefeld section of the Austrian Tyrol, is the material introduced by Unna in 1882.

Available as Ichthyol concentrate, full strength, in 4 oz. jars, and Ichthyol ointment, 10 and 20% strengths, in 1 oz. tubes.

Ichthammol, N. F. (Lilly, Mallinckrodt, Penick)

This includes ichthammol made from any bituminous shales or schists.

Available in 10 and 20% concentrations in 1 oz. tubes.

WOOD TARS

Wood tars are obtained from the destructive distillation of wood. The source is usually juniper or pine trees and less commonly birch or beech. These tars contain acetic acid but not anthracene or sulfur and are not soluble in water. They are used for antipruritic baths and liniments and ointments; although very effective, they are more irritating than coal tars

Juniper Tar

Juniper tar, or oil of cade, represents the volatile oil from the wood of *Juniperus oxycedrus* L., Pinaceae. It contains cadinene as well as other hydrocarbons and aromatic compounds.

1. *Juniper Tar*, N. F.
2. *Juniper Tar* (Almay)

This is available in the following forms: an aqueous solution for antipruritic baths containing 35% juniper tar plus sulfonated oil and fatty acid esters; a water-washable ointment with 4% tar for topical use; a shampoo with 4% tar; and a cake soap with 10% tar.

Available as bath solution in 11 oz. bottles, ointment in 4 oz. jars, shampoo in 8 oz. bottles and soap in 4 oz. cakes

Pine Tar

Pine tar is obtained by destructive distillation of the wood

Irradiation of the scalp Place sheet or towel over face and put on sun goggles. Cover the ears, neck and other nonhairy regions. Sitting position is advisable.

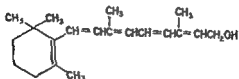
Sun lamp Place lamp 10 in. above the scalp. After turning on the lamp, an assistant should make multiple parts in the hair at $\frac{1}{2}$ in. intervals in the front and back of the scalp. First exposure time is 15 seconds to each part. Treat scalp twice weekly, increasing exposure each time by 15 seconds up to 1 minute to each part. Do not exceed 1 minute.

Quartz tube Follow the directions given for the sun lamp, but keep distance at 20 in. rather than 10.

VITAMINS, AMINO ACIDS AND PROTEINS

For illnesses due to mixed or single vitamin deficiencies, gratifying results are obtained by supplying the patient with the missing vitamins. The situation is not clearcut when it comes to the use of vitamins for diseases that are not directly related to vitamin deficiencies. For example, vitamins A and C have been given for acne; riboflavin and vitamin B₁₂ for psoriasis; PABA for scleroderma; vitamin D for sarcoidosis, etc. In all of these cases there is no conclusive evidence that the vitamin therapy is of actual benefit. In this section we will list only a few of the common vitamins reputed to be of value in some dermatoses.

Vitamin A



Vitamin A

Indication Vitamin A may be of benefit in treatment of Darier's disease and ichthyosis, in which conditions it is

Sun lamp Begin with exposure of 1 minute to the front and 1 minute to the back. Increase exposure time $\frac{1}{2}$ minute daily up to 6 minutes, front and back. Then increase 1 minute daily up to 15 minutes, front and back. Subsequent treatments may be continued daily without further increase in exposure time.

Quartz tube The following schedule is used

TREATMENT DAY	EXPOSURE TIME, MIN	DISTANCE OF SKIN FROM BURNER, IN
1	$\frac{1}{4}$	30
2	$\frac{1}{2}$	30
3	1	30
4	$1\frac{1}{2}$	30
5	2	30
6	$2\frac{1}{2}$	30
7	3	30
8	$3\frac{1}{2}$	30
9	4	30
10	$4\frac{1}{2}$	30
11	5	30
12	5	28
13	5	26
14	5	24
15	5	22
16	5	20
17	5	18

The minimum distance between the skin and the light source is 18 in. After the 17th treatment day, the time factor is increased 30 seconds daily until 15 minutes is reached. At this point the exposure time and distance should be kept constant.

Irradiation of isolated areas Cover with cotton or linen sheets all regions outside the area to be irradiated.

Sun lamp Proceed as mentioned above, but keep distance at 10, 15 or 20 in instead of 30.

Quartz tube Proceed as outlined in the table.

Irradiation of the face Expose left side, right side and front of face successively. Cover eyes with special goggles or moist cotton.

Sun lamp Place lamp 15 in from the tip of the nose. Begin with exposure of 1 minute to each of the 3 fields. Increase exposure time 30 seconds daily up to 10 minutes. Then continue daily without further increase in exposure time.

Quartz tube Proceed as outlined in the table.



Para-aminobenzoic acid

Para-aminobenzoic acid has been claimed to be effective in treatment of scleroderma and dermatitis. It is known. 2-4 Gm. of the potassium salt of PABA by mouth, 3-6 Gm. daily and increasing gradually until the maximum dose is reached and then maintained. For prolonged use, the sodium salt of PABA is not recommended because of retention of fluid. It is Potaba (Glenwood Lab) in 0.5 Gm. tablets or capsules, 2 Gm. ampules and 100 Gm. or 1 lb. powder.

Natural vitamin D known as vitamin D₂ results from irradiation of ultraviolet light on 7-dehydrocholesterol present in the malpighian layer of the epidermis. Vitamin D₂ is found naturally in fish oils. There is no vitamin D₃ known as calciferol is produced from irradiation of ergosterol, a steroid present in yeast and also in the same antirachitic active in cod liver oil. Irradiation of ergosterol produces vitamin D₂ and tachysterol (A.T.) which has antirachitic activity but little antitumor activity. Tachysterol is applied to all the products of ergosterol. Plants differ from animals in that they contain phytonosterol rather than ergosterol.

involved in keratin formation in pityriasis rubra pilaris

and tablets (Walker, U S Vita-

bullosa seem to have slowly DL-valine for long periods. No acids in the following from a metabolic defect. Arginine and collagen have in up of only a few different. Unlike collagen, arginine and valine. Since there is no apparent collagen in both collagen and arginine. However, the utilization is abnormal, and the components of these two



usually The amino acid chemical supply company. It is supplied with milk or cream. It is more costly than other products. It is more expensive than

applied topically For treatment of phrynoderma, pityriasis rubra pilaris and seborrheic keratoses, vitamin A has been used both orally and topically

Mode of action In phrynoderma, vitamin A is given orally to compensate for a vitamin deficiency In this case it acts as a replacement for a substance lacking in the diet In Darier's disease, ichthyosis and phrynoderma, topically applied vitamin A may cause inhibition of epidermal sulphhydryl groups, which are required for keratin formation, and not be a vitamin supplement for a specific metabolic process

Caution Toxic effects from overdosage or prolonged systemic administration of vitamin A include anorexia, weakness, headache, exophthalmos, hepatomegaly, splenomegaly, bone and joint tenderness, alopecia and ecchymoses

Dose Topical—50,000–100,000 units (1.5–3%) vitamin A per gram of Neobase or Lubriderm applied once or twice daily

Oral—50,000–150,000 units daily

Available as synthetic vitamin A, 50,000 units per capsule or tablet, from several pharmaceutical companies

Vitamin B

VITAMIN B COMPLEX

Indication Vitamin B complex is used in the treatment of pellagra, cheilitis and chronic debilitating dermatoses such as pemphigus and exfoliative erythroderma

Mode of action The vitamins of the B complex act as coenzymes for energy-yielding metabolic reactions These vitamins must be added to the diet of patients suffering from vitamin B deficiency or whose nutritional requirements are in excess of normal

Dose 1–2 capsules daily by mouth, depending upon concentration per capsule Numerous commercial preparations are available

PABA



Para aminobenzoic acid

Indication Para aminobenzoic acid has been claimed to be of possible use in treatment of scleroderma and dermatitis herpetiformis

Mode of action Not known

Dose 8-15 Gm. of the potassium salt of PABA by mouth, beginning with 1 Gm daily and increasing gradually until

reached and then maintained For

Vitamin D

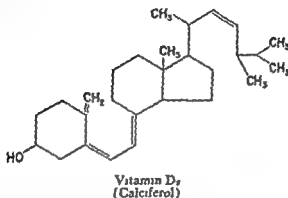
Natural vitamin D, known as vitamin D₃, results from the action of ultraviolet light on 7-dehydrocholesterol present in milk or the malpighian layer of the epidermis Vitamin D₂ also occurs naturally in fish oils There is no vitamin D₁ Vitamin D₂ known as calciferol, is produced from ultraviolet light irradiation of ergosterol, a steroid present in yeast Vitamin D₂ has almost the same antirachitic activity as vitamin D₃ in rats but less in chicks

formation of lum

reduced to dihydr

antitetrany activity but little antirachitic effect The term *ergosterol* is applied to all the products resulting from irradiation of ergosterol Plants differ from yeasts and animals in that they contain phytosterol rather than ergosterol or 7-dehydro-

cholesterol. In treatment of skin diseases, calciferol is used more often than vitamin D₂ because it is readily available in pure form.



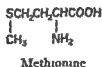
Indication Calciferol is used for treatment of lupus vulgaris and is of possible use in parapsoriasis.

Mode of action Unlike bacteriostatic and bactericidal chemotherapeutic agents, calciferol has no direct effect on the tubercle bacillus but stimulates the reaction of the host to the organism so that fibroblastic activity is increased.

Caution Nausea, vomiting, headache and kidney damage may occur. Serum calcium levels should be checked frequently.

Dose 50,000–150,000 units daily by mouth. Numerous commercial preparations are available.

DL-Methionine



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the
high
subsequently can be changed to cystine through metabolic re-

actions methionine probably is involved in keratin formation

Indication May be effective in pityriasis rubra pilaris

Mode of action Not known

Dose 1-2 Gm 3 times daily

Available in 0.5 Gm capsules and tablets (Walker, U S Vitamin, Ives Cameron)

L-Leucine and DL-Valine

Some infants with epidermolysis bullosa seem to have slowly improved when fed L-leucine and DL-valine for long periods. The rationale for giving these amino acids is the following. Epidermolysis bullosa may result from a metabolic defect involving elastic fibers. Elastic fibers and collagen have in common the property of being made up of only a few different kinds of amino acids, as shown in the table. Unlike collagen, elastin contains large amounts of leucine and valine. Since patients with epidermolysis bullosa have no apparent collagen deficiency the amino acids common to both collagen and elastin probably are metabolized normally. However, the utilization of leucine and valine might be abnormal, and the patient may benefit from daily supplements of these two amino acids.



L-Leucine



DL-Valine

Dose 1 Gm of each amino acid by mouth daily. The amino acids in powder form, available from biochemical supply companies (Nutritional Biochemicals or California Corporation for Biochemical Research) — — —

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expensive than

**PER CENT COMPOSITION IN ROUND FIGURES OF AMINO ACIDS
IN COLLAGEN AND ELASTIN**

AMINO ACID	COLLAGEN	ELASTIN
Glycine	30	30
Proline	15	15
Hydroxyproline	15	2
Alanine	10	20
Aspartic acid	10	1
Arginine	10	1
Glutamic acid	10	2
Leucine	4	10
Valine	2	20

Plain Gelatin (Knox)

Gelatin is a protein obtained by boiling skin, tendons, ligaments, bones, etc., with water. Eighty nine per cent of its composition is derived from 6 amino acids which are present in the following approximate percentages

Glycine	27%
Proline	17%
Hydroxyproline	15%
Alanine	11%
Aspartic acid	10%
Arginine	9%

Indication Brittle nails

Mode of action The mechanism of action is unknown, but it is possible that gelatin provides the optimal amount of an amino acid required for normal nail formation. Although glycine is the amino acid present in the greatest amount, it is not solely responsible for the efficacy of gelatin because administration of large doses of glycine alone does not cause improvement of brittle nails.

Dose 7 Gm ($\frac{1}{4}$ oz envelope) by mouth daily for 3 months. The gelatin may be mixed with water, fruit juice or some other beverage. Gelatin also is available in capsules, in which form it is easier to swallow. However, the dose advertised for capsules is usually very small, and the capsules are considerably more expensive than plain gelatin.

Wart Removers, Keratolytics and Caustics

Sal-Lac in Flexible Collodion

Salicylic acid 10%
Lactic acid 10%
In flexible collodion



Salicylic acid



Lactic acid

Flexible collodion consists of 2% camphor and 3% castor oil in collodion. Collodion contains 4% pyroxylin (chiefly dinitro-cellulose) in a solution made up of 1 volume of absolute ethyl alcohol and 3 volumes of diethyl ether.

Indication: Common wart (*verruca vulgaris*). May be used for flat warts (*verrucae plana*) if concentrations of salicylic and lactic acids are reduced to 5% each.

Mode of action: Salicylic and lactic acids act corrosively on warts. Collodion keeps these caustic agents in contact with the wart and also delimits their zone of activity.

Application: This preparation is applied to the wart surface with a toothpick and allowed to remain for 24 hours. It is then peeled off, and a fresh application is made. This procedure is followed for 3 weeks. If soreness develops, 2-day intervals should be allowed between applications. Children's skin may become irritated after a single application. For children, use 5% each of salicylic acid and lactic acid in flexible collodion instead of 10%.

Available on prescription.

Formaldehyde in Aquaphor

40% formaldehyde	4 ml
Aquaphor	15 Gm

HCHO
Formaldehyde

Indication Common and plantar warts (verrucae vulgaris and plantaris)

Mode of action Formaldehyde acts corrosively on warts

Application Apply sparingly to warts, using a small applicator such as a toothpick once daily. As lesions become firm, remove the hardened keratin by paring gently with a razor blade. Reapply preparation. This procedure should be carried out once daily for 3 to 4 weeks or until disappearance of the warts.

Available on prescription

Salicylic Acid Plaster (Duke)

Salicylic acid	40%
In elastic adhesive plaster bandage	

Indication Plantar warts and calluses

Mode of action Salicylic acid in 40% concentration acts corrosively on tissue

Application The plaster should be cut to conform to the size of the lesion over which it is then placed and allowed to remain for 2 days. The plaster is then removed, after which the foot is soaked in water for ½ hour and the hyperkeratotic lesion scraped with a scalpel or razor blade. New plaster is then applied. 2 to 4 such applications should be sufficient. If lesions recur, re treatment may be necessary.

Carbon Dioxide (dry ice)

Indication Plantar wart

Mode of action When solid carbon dioxide, which has a temperature of approximately -78°C , is applied to a wart for a sufficient period of time the wart as well as some adjacent normal tissue becomes devitalized.

Application Solid carbon dioxide in the form of a pencil or disc, is applied to the lesion with firm pressure for 3 to 5

minutes. The shape and area of the carbon dioxide used should conform exactly to the contour of the wart. Carbon dioxide must not be allowed to come in contact with normal skin. Within 11 or 3 days a deep vesicle forms beneath the wart so that the wart may be excised easily by using a scalpel or scissors without anesthesia. An antibiotic ointment or powder should be applied to the wound, which should then be dressed with an elastic adhesive bandage.

Solid carbon dioxide may be formed in small plastic tubes of various diameters upon the sudden release of carbon dioxide gas into the tubes. A portable unit (Kiddle) is available, or one can direct carbon dioxide gas from a large cylinder into the small plastic tubes, using an adapter designed by Stolar. Solid carbon dioxide also may be obtained from local dairies.

Liquid Nitrogen (N_2)

Indication Common wart

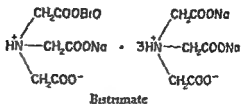
Mode of action Liquid nitrogen boils at a temperature of $-196^\circ C$. When applied to a wart, it destroys the lesion through freezing. Because it is much colder than dry ice, liquid nitrogen is more effective and requires a shorter time of application.

Application The wart should be pared before liquid nitrogen

contact with the liquid nitrogen, and some discomfort may be present for 24 hours. A deep vesicle usually develops at the base of the wart within 1 to 3 days. At this time, without local anesthesia, the lesion may be lifted up with forceps and excised at the base with scalpel or scissors.

Bistrimate Tablets (Smith, Carrol Dunham)

Bistrimate consists of sodium bismuth trichollamate combined with 3 equivalents of disodium trichollamate to form a double saltlike compound.



Indication It has been claimed that bistrimate is of value in the treatment of flat and common warts, although one statistical study showed no difference between treated and control groups

Mode of action Unknown It is possible that psychotherapy associated with administration of tablets is a factor

Dose Initially, 1 tablet by mouth 3 times daily after meals for 2 to 3 days, then 2 tablets 3 times daily for 3 to 4 weeks

Available as tablets, each containing 410 mg of sodium bismuth triglycollamate, which is equivalent to 75 mg of elemental bismuth

Side effects Aphthous stomatitis and renal damage; Urinalyses should be followed

Podophyllin

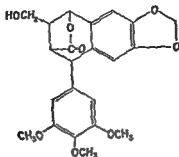
Podophyllin can be prepared in any of the following forms

- | | | |
|---|--------------------------|--------|
| 1 | Podophyllin powder | 20-25% |
| | Suspended in mineral oil | |
| 2 | Podophyllin solution | 20% |
| | In 95% ethyl alcohol | |
| 3 | Podophyllin | 20% |
| | In an ointment base | |

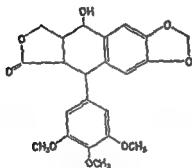
Podophyllin, the common name for podophyllum resin, is obtained from the rhizome and roots of the herb, mandrake (may apple). The active ingredients are podophyllotoxin and picropodophyllin. Inactive chemicals present include picropodophyllinic acid, podophyllinic acid and podophylloquercetin.

Indication Venereal warts (condylomata acuminata). Has also been used for seborrheic keratoses

Mode of action Unknown Podophyllin appears to be specific for treating venereal warts and is not very effective in removing other types



Podophyllotoxin



Picropodophyllin

Application The skin surrounding the lesion to be treated should be protected with zinc oxide paste. The podophyllin preparation is then applied. In 6-12 hours, the treated lesion should be washed in order to remove the podophyllin. A few hours after application to venereal warts, the lesions become blanched. In 24-48 hours they appear necrotic. On the 3d day they begin to slough and then disappear without scarring. The recurrence rate is approximately 15%. Surgical destruction of recurrent lesions has been advocated in some cases.

Available on prescription

Other Corrosive Substances

Many other corrosive substances such as trichloroacetic acid (25% in water to full strength), euphorbia resin (milk weed), fuming nitric acid, etc., are at times effective in the treatment of warts. However, care must be taken in their application because unsightly keloids sometimes develop.

Salicylic Acid Ointment

Salicylic acid 5-10%
In an ointment base

Indication: Localized hyperkeratosis such as keratosis of the palms and soles. This preparation also can be used to remove the surface of thin milia.

Mode of action: Salicylic acid is keratolytic in this concentration range.

Application: Apply twice daily to involved areas.

Available on: prescription.

Silver Nitrate

10 or 25% silver nitrate in water
or
silver nitrate applicator stick
(Clay Adams, Arzol Chemicals, Tappan, Zee)

The sticks are composed of about 75% silver nitrate and 25% potassium nitrate.

Indication: Silver nitrate can be used in solution or as an applicator stick to destroy excess granulation tissue and to cauterize fissures and ulcers in order to stop weeping.

Mode of action: Silver nitrate acts as a caustic by coagulating tissue protein thereby stopping oozing and allowing for epithelization.

Application: Silver nitrate solutions should be applied to the involved areas with a cotton tipped applicator. The stick should be moistened with water before use. Fissures and ulcers may be touched lightly but granulation tissue requires exertion of pressure when the silver nitrate is being applied.

Wet Dressings

WET DRESSINGS, which consist of bandages soaked in mineral solutions, are applied to involved areas and either left open or enclosed in a water tight covering such as plastic, waxed paper or oiled cloth. The open type of dressing is used more frequently in dermatologic therapy. The systemic use of steroids concomitantly with topical wet dressings has greatly shortened the time required to achieve a beneficial effect.

Indication Open wet dressings are used to soothe and cool superficial inflammation, to dry weeping or oozing lesions, to cleanse crusts, to drain and treat infected areas and to relieve pruritus. Closed wet dressings may be used when it is desirable to retain heat rather than permit evaporation and cooling. Also, they promote maceration of the skin. Soothing solutions for acute lesions are aluminum acetate preparations. In the presence of marked weeping, silver nitrate or potassium permanganate is preferred. For skin infections due to bacteria, wet dressings made with silver nitrate, potassium permanganate or antibiotics are indicated. For mycotic infections, potassium permanganate is the agent of choice.

Mode of action Wet dressings have a soothing and antipruritic effect on inflamed skin and a cleansing action as well. When they are left open, cooling occurs through evaporation of water. When they are closed, water cannot evaporate and heat is retained. Through the prolonged soaking inherent in closed dressings, maceration occurs. The active agents in wet dressings, such as silver nitrate, aluminum acetate, lead acetate and potassium permanganate, precipitate proteins and through this mechanism lead to suppression of weeping. The action of potassium permanganate is due to its oxidizing properties. The antibiotic wet dressings, as well as the preceding ones, are germicidal.

Application Soft cloths, such as old handkerchiefs, bed linen, Kerlix or soft gauze fluffs, are used for wet dressings. Gauze

amounts which may or may not also include lead acetate

$\text{Al}(\text{CH}_3\text{COO})_3$ Aluminum acetate	$\text{Al}_2\text{O}(\text{CH}_3\text{COO})_4 \cdot 4\text{H}_2\text{O}$ Aluminum subacetate
$\text{Pb}(\text{CH}_3\text{COO})_2 \cdot 3\text{H}_2\text{O}$ Lead acetate	$\text{Al}_2(\text{SO}_4)_3 \cdot 18\text{H}_2\text{O}$ Aluminum sulfate
$\text{Ca}(\text{CH}_3\text{COO})_2 \cdot \text{H}_2\text{O}$ Calcium acetate	CaCO_3 Calcium carbonate

Following are the most frequently used aluminum acetate preparations.

1 BUROW'S SOLUTION, USP

Burow's solution, described in the United States Pharmacopeia is also known as aluminum acetate solution and contains approximately 5% neutral aluminum acetate

Aluminum subacetate solution	545 ml
Glacial acetic acid	15 ml
Dilute with water to make	1,000 ml

Up to 0.6% boric acid may be added to prevent precipitation of a basic compound which forms on standing

For use as a wet dressing, the stock solution must be diluted 1/16, 1/20 or 1/32

FINAL STRENGTH	BUROW'S STOCK SOL.	WATER TO DILUTE
1/16	30 ml (1 oz.)	1 pt.
1/20	30 ml (1 oz.)	1 1/4 pt
1/32	15 ml (1/2 oz.)	1 pt

2 BUROW'S SOLUTION WITH LEAD ACETATE

Aluminum acetate	87 Gm
Lead acetate	150 Gm
Water to make	1,000 ml.

For use as a wet dressing the stock solution must be diluted 1/16, 1/20 or 1/32, as shown above

3 ALUMINUM SUBACETATE SOLUTION, USP

Aluminum sulfate	160 Gm
Acetic acid	160 ml
Precipitated calcium carbonate	70 Gm.
Water to make	1,000 ml.

Dilute 1/16, 1/20 or 1/40, as described above.

4 DOMEBORO TABS AND POWDER (Dome)

Effervescent tablets or packaged powder can be used conveniently by nonhospitalized patients to prepare aluminum acetate solution. Each packet contains 2.2 Gm of powder or a 2.2 Gm tablet made up of 60% aluminum sulfate, 38% calcium acetate and 2% boric acid. The boric acid is used to buffer the preparation to pH 4.2-4.5. In addition, each tablet contains sodium bicarbonate for easy solubility through effervescence. When the tablet or powder is dissolved in water, the following reaction occurs so that fresh aluminum acetate is available for use:



Dissolve the contents of 1 packet in 1 pt of water for a 1:20 solution of aluminum acetate.

Silver Nitrate (AgNO_3)

Silver nitrate can usually be obtained in a 10 or 25% stock solution. For wet dressings this should be diluted so that the final concentration of silver nitrate is 1:750 or 1:1,000. Ordinary tap water can be used provided its chloride content is low. In localities where such water is not readily available, distilled or demineralized water must be used.

FINAL STRENGTH	AgNO_3 STOCK SOL 15 ML (½ Oz)	WATER TO DILUTE
1/750	10%	1 qt
	25%	2½ qt
1/1,000	10%	1½ qt
	25%	4 qt

Silver nitrate stains clothing and skin. Stains may be removed either by first moistening with iodine (2%) and then washing immediately with water or by applying a 10% solution of potassium iodide and then removing the resulting yellow color with thiosulfate solution.

Potassium Permanganate (KMnO_4)

Potassium permanganate is usually available in 65 or 300 mg (1 or 5 gr) tablets. A fresh solution must be made up

for each application by crushing the tablet to a fine powder between 2 tongue blades and then dissolving the powder in water. Solutions of 1:4,000 or 1:9,000 strength are used.

FINAL STRENGTH	KMnO ₄ TABLETS	WATER TO DILUTE
1/4 000	65 mg (1 gr) 330 mg (5 gr)	½ pt 1½ qt
1/9 000	65 mg (1 gr) 330 mg (5 gr)	1 pt 3 qt

Potassium permanganate stains skin, clothing and tub. Stains can be removed with dilute sulfurous or oxalic acids or hyposulfite solutions.

Antibiotics

Wet dressings can be prepared by dissolving the indicated quantity of antibiotic in saline. Neomycin has greater stability than the other antibiotic wet dressings.

1. BACITRACIN

Gram positive bacteria, gonococcus, meningococcus.
100 units bacitracin per ml saline.

Available as dry powder in 2,000, 10,000 and 50,000 unit vials.

2. NEOMYCIN SULFATE

Gram positive and gram negative bacteria. M. tuberculosis.
2 mg neomycin per ml saline.

Available as powder in 500 mg vials.

3. POLYMYXIN B SULFATE

Gram negative bacteria including pyocyanus but not proteus.

1 mg polymyxin per ml saline.

Available in 20 mg vials.

Magnesium Sulfate (Epsom salts, MgSO₄·7H₂O)

For wet dressings, prepare a 1:65 solution by dissolving 1 tablespoon per qt. of water.

Dalibour Solution

A 1:16 dilution can be prepared by dissolving the contents

4 DOMERBORO TABS AND POWDER (Dome)

Effervescent tablets or packaged powder can be used conveniently by nonhospitalized patients to prepare aluminum acetate solution. Each packet contains 2.2 Gm of powder or a 2.2 Gm tablet made up of 60% aluminum sulfate, 38% calcium acetate and 2% boric acid. The boric acid is used to buffer the preparation to pH 4.2-4.5. In addition, each tablet contains sodium bicarbonate for easy solubility through effervescence. When the tablet or powder is dissolved in water, the following reaction occurs so that fresh aluminum acetate is available for use:



Dissolve the contents of 1 packet in 1 pt of water for a 1:20 solution of aluminum acetate.

Silver Nitrate (AgNO_3)

Silver nitrate can usually be obtained in a 10 or 25% stock solution. For wet dressings this should be diluted so that the final concentration of silver nitrate is 1:750 or 1:1,000. Ordinary tap water can be used provided its chloride content is low. In localities where such water is not readily available, distilled or demineralized water must be used.

FINAL STRENGTH	AgNO_3 STOCK SOL., 15 ML. ($\frac{1}{2}$ Oz.)	WATER TO DILUTE
1/750	10%	1 qt
	25%	2 $\frac{1}{2}$ qt
1/1,000	10%	1 $\frac{1}{2}$ qt
	25%	4 qt

Silver nitrate stains clothing and skin. Stains may be removed either by first moistening with iodine (2%) and then washing immediately with water or by applying a 10% solution of potassium iodide and then removing the resulting yellow color with thiosulfate solution.

Potassium Permanganate (KMnO_4)

Potassium permanganate is usually available in 65 or 300 mg (1 or 5 gr) tablets. A fresh solution must be made up

for each application by crushing the tablet to a fine powder between 2 tongue blades and then dissolving the powder in water. Solutions of 1:4,000 or 1:9,000 strength are used.

FINAL STRENGTH	KMnO ₄ TABLETS	WATER TO DILUTE
1/4,000	65 mg (1 gr)	1/2 pt
	330 mg (5 gr)	1 1/2 qt
1/9,000	65 mg (1 gr)	1 pt
	330 mg (5 gr)	3 qt

Potassium permanganate stains skin, clothing and tub. Stains can be removed with dilute sulfurous or oxalic acids or hyposulfite solutions.

Antibiotics

1. BAGITRACIN

vials

2. NEOMYCIN SULFATE

Gram positive and gram negative bacteria, *M. tuberculosis*

2 mg neomycin per ml saline

Available as powder in 500 mg vials

3. POLYMYXIN B SULFATE

Gram negative bacteria including *pyocyaneus* but not *proteus*

1 mg polymyxin per ml saline

Available in 20 mg vials

Magnesium Sulfate (Epsom salts $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$)

For wet dressings prepare a 1:65 solution by dissolving 1 tablespoon per qt. of water.

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Silver nitrate can usually be obtained in a 10 or 25% stock solution. For wet dressings this should be diluted so that the final concentration of silver nitrate is 1:750 or 1:1,000. Ordinary tap water can be used provided its chloride content is low. In localities where such water is not readily available, distilled or demineralized water must be used.

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of one 22 Gm packet in 1 qt of water The composition of undiluted Dalibour solution is

Zinc sulfate	2.25%
Copper sulfate	0.65%
Camphor	0.10%

Available as Dal-Sol powder (Dome) in 22 Gm packets

Physiologic Saline (0.86% NaCl)

Physiologic saline is a mild but relatively inactive solution for wet dressings which can be prepared by dissolving 1 level tsp of table salt in 1 pt of water

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